SELECTED WATER RESOURCES ABSTRACTS

VOLUME 7, NUMBER 19
OCTOBER 1, 1974

W74-09801 -- W74-10350

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WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

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The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

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SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

INTERFACIAL INTERACTION OF WATER AND SILICATE MINERALS,
Missouri Univ., Kansas City. Dept. of Physics.
For primary bibliographic entry see Field 2K.
W74-09805

ASSOCIATION CONSTANTS OF ION PAIRS IN NATURAL WATERS,
Missouri Univ., Columbia. Dept. of Geology.
For primary bibliographic entry see Field 2K.
W74-09806

2. WATER CYCLE

2A. General

A PRELIMINARY REPORT ON URBAN HYDROLOGY AND URBAN WATER RESOURCES: OAHU, HAWAII,
Hawaii Unin., Honolulu. Water Resources Research Center.
Y. S. Fok.
Available from the National Technical Information Service as PB-233 783 $3.75 in paper copy, $1.45 in microfiche. Technical Report No 74, October 1973. 44 p, 10 fig, 6 tab, 25 ref. OWRR B-028-HI(1), 14-31-0001-3873.

Descriptors: *Hawaii, Watersheds(Basins), Storm drains, *Urban hydrology, Unit hydrographs, Streamflow, Rainfall-runoff relationships, Simulation analysis, Model studies, Data collections, Computer programs.
Identifiers: *Oahu(H.I.), Storm hydrographs.

Project objectives were to: evaluate several watershed simulation models for their applicability to local conditions, expand the data collection in the research watersheds, and identify problem areas for subsequent study. The instantaneous unit hydrograph theory was explored in detail with results indicating the Nash method to have best applicability. The Kentucky Watershed Model's principle of continuous balancing of the water budget within a given watershed is applicable to Hawaiian conditions, but would require two to three years for its applicable to Hawaiian conditions, but would require two to three years for its modification. The Road Research Laboratory Model was tested using three storm events, but the input data seemed inadequate to providing the desirable simulation. The Multiple Regression Model was applied to correlate peak flow to the drainage area, urbanized area, rainfall, and time to peak. Results indicated that the model is very promising. Several mathematical conceptual models were also tested, and the nonlinear time variant watershed model was found to be the best. Some water quality elements were measured during 1972-73. Only a few samples were taken due to the very dry weather. The data collection program has been expanded to include evaporation, soil moisture, wind speed, solar radiation, and water quality in addition to rainfall and streamflow records gathered since initiation of the project.
W74-09803

STOCHASTIC ANALYSIS OF PHREATIC AQUIFERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W74-09882

A PARTIAL AREA MODEL FOR STORM FLOW SYNTHESIS,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
E. T. Engman, and A. S. Rogowski.
Water Resources Research, Vol 10, No 3, p 464-472, June 1974. 8 fig, 1 tab, 28 ref.

Descriptors: *Storm runoff, *Rainfall-runoff relationships, *Hydrograph analysis, *Mathematical models, Overland flow, Synthetic hydrology, Infiltration, Base flow, Simulation analysis.

A storm hydrograph model is based on the partial contributing area concept. It utilizes a physically based infiltration capacity distribution for computation of rainfall excess, and it incorporates two stages of kinematic routing. In the first stage the rainfall excess is routed over a flow plane to become the lateral inflow hydrograph for the second or channel phase. The overland flow plane expands upslope as the infiltration capacity is exceeded, and the size of contributing area and the length of the flow plane is calculated from infiltration curves. The model attempts to account for the natural watershed variability in terms of necessary input data and boundary and initial conditions. The data requirements are three: they include two Manning's n values, one for the channel and one for the overland flow plane, and the initial soil water content. (Knapp-USGS)
W74-09907

EXPECTED RANGE AND ADJUSTED RANGE OF HYDROLOGIC SEQUENCES,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W74-09908

SEASONAL EFFECTS IN FLOOD SYNTHESIS,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4C.
W74-09910

PROBLEMS IN MODELING URBAN WATERSHEDS,
American Society of Civil Engineers, Marblehead, Mass. Urban Water Resources Research Program.
For primary bibliographic entry see Field 4C.
W74-09911

INTERNATIONAL HYDROLOGICAL DECADE (MEZHDUNARODNOYE GIDROLOGICHESKOYE DESYATILETIYE).
Meteorologiya i Gidrologiya, No 12, p 116-117, December 1973.

Descriptors: *International Hydrological Decade, *Conferences, *Forecasting, *Hydrology, *Data collections, Foreign countries.
Identifiers: USSR, *Danube River.

The Seventh Conference of Danube countries on Hydrologic Forecasting was held at the Golden Sands health spa near Varna (People's Republic of Bulgaria) June 5-10, 1973. Participants included delegates from the People's Republic of Bulgaria (20), the USSR (19), Yugoslavia (16), Czechoslovakia (9), the Federal Republic of Germany (10), Austria (9), the Hungarian People's Republic (2), and Romania (1), as well as representatives of UNESCO and the Danube Commission. A total of 44 papers were presented, including 26 papers on problems of forecasting the water regime, 6 papers on problems of forecasting the ice regime, 8 papers on problems of channel processes and water quality, and 4 papers on other problems of hydrology. The Soviet contribution consisted of 13 papers. A characteristic feature of most papers was the broad application of modern methods of mathematical analysis by computers for hydrologic forecasting. A large number of papers were devoted to formulation of mathematical models and to physical analysis of hydrologic processes. Papers from the Soviet Union contained results of investigations of important general problems of hydrologic forecasting and specific recommendations on procedures to be followed in forecasting water and ice regimes of the Danube. Papers of the Seventh Conference were forwarded to libraries of the USSR Hydrometeorological Center and the Ukrainian Hydrometeorological Scientific Research Institute. (Josefson-USGS)
W74-09934

NETWORK FLOW MODELING OF MULTIRESERVOIR DISTRIBUTION SYSTEMS,
Texas Univ., Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 4A.
W74-09952

MORPHOGENETIC STUDY OF TERMINAL TRIANGULAR TRACT OF INLAND STREAMS IN SUTLEJ YAMUNA PLAIN,
Punjab Univ., Chandigarh (India).
For primary bibliographic entry see Field 2E.
W74-10052

WATER ATLAS OF THE UNITED STATES,
For primary bibliographic entry see Field 7C.
W74-10107

AN ERTS VIEW OF ALASKA--REGIONAL ANALYSIS OF EARTH AND WATER RESOURCES BASED ON SATELLITE IMAGERY,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 7B.
W74-10251

2B. Precipitation

RADIOACTIVE FALLOUT IN AIR AND RAIN: RESULTS TO THE MIDDLE OF 1973,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 5B.
W74-09876

NUMERICAL EXPERIMENT FOR SOLVING COMPLETE EQUATIONS OF HYDRODYNAMICS,
M. R. Pipko.
Available from NTIS, Springfield, Va 22151 AD-763 143, Price $3.00 printed copy; $1.45 microfiche. Air Force Systems Command Foreign Technology Division Translation Report FTD-HT-23-593-73, June 20, 1973. 11 p, 2 fig, 10 ref. (Translation of Ob' yektivnyy Analiz Meteorologicheskikh Poley 1969, p 19-28.)

Descriptors: *Weather forecasting, *Numerical analysis,(Athematical models, Winds, Hydrodynamics.

The equations of hydrodynamics were solved for a numerical weather forecast by using the method of small perturbations. The problem was solved for an incompressible, homogeneous, inviscid, divergent atmosphere. The solutions reflect all the transformations which occurred over a two-day period. The position of centers is forecast and the cyclogenesis process is represented well. (Knapp-USGS)
W74-09898

POINT PROCESSES OF SEASONAL THUNDERSTORM RAINFALL 2. RAINFALL DEPTH PROBABILITIES,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
R. E. Smith, and H. A. Schreiber.
Water Resources Research, Vol 10, No 3, p 418-423, June 1974. 6 fig, 1 tab, 13 ref.

Descriptors: *Thunderstorms, *Rainfall, *Probability, Depth-area-duration analysis, Statistics, Statistical methods, Stochastic processes, Distribution patterns.

The probabilistic nature of daily rainfall depths was examined. Daily rainfall depths were well described by a compound exponential distribution. Some 1600 to over 2000 daily rainfalls from three stations were partitioned in various conceptual ways to evaluate homogeneity with respect to the pattern of occurrence with sequences or seasons as well as the annual variance of population properties. Although some small but statistically significant inhomogeneities were found, the statistical description of depths in arbitrary intervals, such as annual total depths, is treatable as the sum of a random number of independent random variables by using the model for rainy day occurrence. Simulations from this model match well the measured data from the stations treated. The effect of truncation of the rainfall sample on both depth distribution and Markov chain dependence is discussed. Daily depths are functions of individual storm occurrence probability (number per day) and storm depth distributions. (See also W74-09928) (Knapp-USGS)
W74-09927

POINT PROCESSES OF SEASONAL THUNDERSTORM RAINFALL 3. RELATION OF POINT RAINFALL TO STORM AREAL PROPERTIES,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
R. E. Smith.
Water Resources Research, Vol 10, No 3, p 424-426, June 1974. 3 fig, 8 ref.

Descriptors: *Thunderstorms, *Rainfall, *Probability, Depth-area-duration analysis, Statistics, Statistical methods, Stochastic processes, Distribution patterns.

Study of the stochastic nature of thunderstorm occurrence and the probability of daily rainfall depths shows the importance of point rainfall information to areal rain distribution. A probabilistic expression is given for the relationship between the point depth of rainfall, the local probability distribution of storm cell maximum depth, and the dimensionless expression of storm depth-area pattern. In a sample test the expression was successfully used to reproduce point rainfall depth probability from storm maximum depth distribution and depth area data from Tombstone, Arizona. (See also W74-09927) (Knapp-USGS)
W74-09928

SPLASH CORRECTION FACTORS FOR SOIL EROSION STUDIES,
Agricultural Research Service, Saint Paul, Minn.
For primary bibliographic entry see Field 2J.
W74-10210

PROTECTION AGAINST HAILSTORMS IN MOLDAVIA,
For primary bibliographic entry see Field 3B.
W74-10232

SUMMARY REPORT--WEATHER MODIFICATION, FISCAL YEARS 1969, 1970, 1971,
GEOMET, Inc., Rockville, Md.
For primary bibliographic entry see Field 3B.
W74-10233

EXPERIMENTAL AND THEORETICAL INVESTIGATIONS OF ARTIFICIAL CRYSTALLIZATION AND DISPERSAL OF SUPERCOOLED CLOUDS,
For primary bibliographic entry see Field 3B.
W74-10234

AIRBORNE MEASUREMENTS OF THE SIZE DISTRIBUTION AND THE CONDENSATION AND ICE NUCLEATING ABILITY OF PARTICLES PRODUCED BY AGI CONTAINING PYROTECHNICS AND ACETONE SOLUTION BURNERS,
Pacific-Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 3B.
W74-10239

ESTIMATED RAINFALL FOR DRAINAGE CALCULATIONS IN THE UNITED KINGDOM,
Transport and Road Research Lab., Crowthorne (England).
C. P. Young.
Available from NTIS, Springfield, Va 22151 PB-226 513, Price $3.25 printed copy; $1.45 microfiche. Report LR 595, 1973. 21 p, 4 fig, 15 tab, 5 ref, append.

Descriptors: *Rainfall, *Distribution patterns, *Rainfall-runoff relationships, Statistics, Data collections, Rainfall intensity, Computer programs, *Sewers, *Designs.
Identifiers: *United Kingdom.

Tables of rainfall in the United Kingdom were computed from the Bilham rainfall formula, taking account of the latest work of the Meteorological Office. An algorithm for calculating the figures is presented. The rainfall profile used in most of the computer programs based on TRRL hydrograph method of sewer design is also given. (Knapp-USGS)
W74-10241

REACTION OF HYGROSCOPIC PARTICLES TO A WARM FOG,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W74-10253

CLOUD-PARTICLE SAMPLES AND WATER CONTENTS FROM A 1969 STORMFURY CLOUDLINE CUMULUS,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W74-10254

ENGINEERING FOG-MODIFICATION EXPERIMENTS BY COMPUTER MODELLING,
Navy Weather Research Facility, Norfolk, Va.
For primary bibliographic entry see Field 3B.
W74-10255

DEVICE FOR AUTOMATIC REMOTE DATA COLLECTION (DARDC),
National Weather Service, Silver Spring, Md. Engineering Div.
For primary bibliographic entry see Field 7A.
W74-10256

2C. Snow, Ice, and Frost

ICE MELTING EXPERIMENTS--A MODEL STUDY FOR BURIAL OF RADIOACTIVE WASTES,
Sandia Lab., Albuquerque, N.Mex.
For primary bibliographic entry see Field 5D.
W74-09868

APPROXIMATE SOLUTION TO THE FREEZING OF THE ICE-WATER SYSTEM WITH CONSTANT HEAT FLUX IN THE WATER PHASE,
New Hampshire Univ., Durham. Dept. of Chemical Engineering.
S. D. Foss, and S. S. T. Fan.
Water Resources Research, Vol 10, No 3, p 511-513, June 1974. 4 fig, 1 tab, 5 ref.

Descriptors: *Freezing, *Heat transfer, *Thermodynamics, Water temperature, Air temperature, Convection, Advection, Ice-water interfaces, Heat flow.

By utilizing the assumption of a quasi steady state temperature profile for the solution to the Stefan problem an approximate solution to the ice-water problem in which a constant heat flux exists in the water phase is developed. Two hypothetical cases are studied. Case 1 considers a step change in the ambient air temperature. Case 2 considers the effect of sinusoidal ambient air temperature fluctuations. A method is given for determining the characteristics heat flux in the water phase. (Knapp-USGS)
W74-09903

A MODIFIED METHOD OF AERIAL SURVEY OF SHADOWS TO STUDY SNOW COVER (NOVYY VARIANT SPOSOBA AEROFOTOS'YEMKI TENEY DLYA IZUCHENIYA SNEZHNOGO POKROVA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
Yu. D. Sharikov, and V. G. Zdanovich.
Meteorologiya i Gidrologiya, No 12, p 72-76, December 1973. 2 fig, 1 tab, 5 ref.

Descriptors: *Snow cover, *Snow surveys, *Aerial photography, Aircraft, Height, Equations, Remote sensing.
Identifiers: USSR.

A modified method of determining thickness of snow cover in mountains by aerial surveys of shadows cast by special stakes is proposed. The stakes were cut from a wooden block 8-10 cm thick. Thin boards 100 x 10 cm and 1.0-1.5 cm thick were used as crosspieces. Three crosspieces spaced 1 m apart were nailed to each stake. The upper crosspiece was secured directly to the top of the stake. The total height of the stakes was 4-5 m. To determine the accuracy of the procedure, heights of the stakes calculated from images of the shadows were compared with actual field values obtained before the aerial survey. Differences in heights of the stakes measured directly and obtained from aerial data did not exceed 1 decimeter. The procedure does not require knowledge of flight altitude, slope angles of the terrain, latitude of the station, or moment of observation. Results of these surveys can be used to estimate water levels in water bodies and streams. (Josefson-USGS)
W74-09930

EXPERIMENT IN DETERMINATION OF WATER EQUIVALENT OF SNOW IN MOUNTAINS BY ABSORPTION OF GALACTIC COSMIC RADIATION (OPYT OPREDELENIYA ZAPASOV VLAGI V SNEZHNOM POKROVE V GORAKH PO POGLOSHCHENIYU GALAKTICHESKOGO KOSMICHESKOGO IZLUCHENIYA),
Institut Prikladnoi Geofiziki, Moscow (USSR).
S. I. Avdyushin, Yu. F. Barabanshchikov, R. M. Kogan, Yu. M. Kulagin, and I. M. Nazarov.
Meteorologiya i Gidrologiya, No 12, p 98-102, December 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Snowpacks, *Water equivalent, *Mountains, *Radiation, *Absorption, Measurement, Instrumentation, Remote sensing, Gravimetry, Equations.
Identifiers: *USSR(Maykhura River valley-Tadzhikistan).

A study of water equivalent of snow in mountainous areas is an important problem which is being solved in behalf of agriculture and hydraulic construction. To determine water equivalent of snow in mountains by recording the intensity of flow of cosmic particles, the high-altitude (2,800 m) Kharam-Kul' snow avalanche station in the Maykhura River valley in Tadzhikistan was selected. This region is characterized by a large water equivalent of snow, reaching 2,000 mm in individual years (1971). At a water-equivalent range of 10-900 mm, the accuracy of measurement of water equivalent by absorption of cosmic radiation is 34 mm. The basic error in determination of water equivalent arises from variability of cosmic radiation. Water equivalent in the 300-10,000 mm range should be measured by absorption of cosmic radiation, and variations of cosmic radiation must be monitored for calibration purposes. The results of measurements can be completely automated, and their results can be telemetered. To study areal distribution of water equivalent of snow in mountains, station determinations should be combined with aircraft measurements, based on a recording of the natural gamma radiation of the Earth. Ways are indicated for further development of remote methods of measurement of water equivalent of snow in mountains. (Josefson-USGS)
W74-09932

MODELING THE PACK ICE AS AN ELASTIC-PLASTIC MATERIAL,
Washington Univ., Seattle. Div. of Marine Resources.
M. D. Coon, G. A. Maykut, R. S. Pritchard, D. A. Rothrock, and A. S. Thorndike.
AIDJEX Bulletin 24, Washington University Division of Marine Resources, p 1-105, May 1974. 47 fig, 4 tab, 31 ref, 2 append. NSF Grant GV-28807 ONR Contract N00014-67-A-0103-0007.

Descriptors: *Sea ice, *Ice cover, *Deformation, Melting, Freezing, Elasticity(Mechanical), Plasticity, Plastic deformation, *Mathematical models, Stress, Strain.

A model of the motion of drifting pack ice in the Arctic Ocean treats explicitly the growth and melt rates of the ice, the formation of leads and pressure ridges, and a mechanical response which is elastic at low stress levels and plastic at some higher, critical state of stress. The strength of the ice is determined by its thickness distribution, and therefore varies because of both thermal and mechanical effects. To examine the behavior of the model, several calculations were made specifying the strain rate history of a single element of pack ice and solving for the ice thickness distribution and the states of stress in the ice. (Knapp-USGS)
W74-09941

STRAIN CALCULATIONS USING AIDJEX 1972 POSITION DATA,
Washington Univ., Seattle. Div. of Marine Resources.
A. S. Throndike.
AIDJEX Bulletin 24, Washington University Division of Marine Resources, p 107-129, May 1974. 10 fig, 3 tab, 3 ref. ONR Contract N00014-67-A-0103-0007.

Descriptors: *Strain, *Stress, Movement, Sea ice, Surveys, Deformation.

Strain and strain rate calculations of sea ice were based on measurements of the positions of three drifting sea ice stations. The measurements were made using the Navy Navigation Satellite System. In processing the data, time derivatives were calculated by Kalman smoothing techniques, and space derivatives by simple finite differences. (Knapp-USGS)
W74-09942

FRACTURE OF SEA ICE SHEETS DUE TO ISOSTATIC IMBALANCE,
Seattle Univ., Wash. Dept. of Civil Engineering.
R. T. Schwaegler.
AIDJEX Bulletin 24, Washington University Division of Marine Resources, p 131-144, May 1974. 7 fig, 6 ref. NSF Grant GV-28807.

Descriptors: *Sea ice, *Deformation, *Failure(Mechanics), Strain, Stress.

The nonuniform thickness of sea ice sheets creates regions of isostatic shear imbalance. The resulting bending stresses are sufficient to cause cracking. The ice sheet was modeled as floating elastic plate with constant flexural rigidity. Variable thickness was obtained by representing the bottom surface as a sine wave. Upper and lower bound curves were obtained for the amplitude of the bottom surface variation versus ice breaking strength. (Knapp-USGS)
W74-09943

INTERNATIONAL SYMPOSIUM ON WASTEWATER TREATMENT IN COLD CLIMATES.
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5D.
W74-10160

ON THE INTERACTION OF WATER AND HEAT TRANSPORT IN FROZEN AND UNFROZEN SOILS: I. BASIC THEORY; THE VAPOR PHASE,
Geulph Univ. (Ontario). Dept. of Land Resource Science.
B. D. Kay, and P. H. Groenevelt.
Soil Science Society of America Proceedings, Vol 38, No 3, p 395-400, May-June 1974. 16 ref.

Descriptors: *Soil water movement, *Frozen soils, *Water vapor, *Heat transfer, Mass transfer, Porous media, Osmosis, Convection, Thermodynamics, Energy dissipation.

A theory is presented for the transport in porous media of water in response to a temperature gradient and the transport of heat in response to a water pressure gradient. These processes were formulated by using the equation of energy dissipation and the Clapeyron equation. Several general forms of the Clapeyron equation were developed in order to find expressions for the transport coefficients of concern. The coupled flow processes are related to the heat of vaporization, the heat of fusion, and the partial specific heat of wetting of the soil water. (See also W74-10216) (Knapp-USGS)
W74-10215

ON THE INTERACTION OF WATER AND HEAT TRANSPORT IN FROZEN AND UNFROZEN SOILS: II. THE LIQUID PHASE,
Geulph Univ. (Ontario). Dept. of Land Resource Science.
P. H. Groenevelt, and B. D. Kay.
Soil Science Society of America Proceedings, Vol 38, No 3, p 400-404, May-June 1974. 10 ref.

Descriptors: *Soil water movement, *Frozen soils, *Water vapor, *Heat transfer, Mass transfer, Porous media, Osmosis, Convection, Thermodynamics, Energy dissipation.

A theory is presented for the transport in frozen and unfrozen porous media of water in response to a temperature gradient and the transport of heat in response to a water pressure gradient. The coupled flow processes occurring in the liquid phase are analyzed. The cause of these processes is the existence of the heat of wetting and the heat of fusion. Expressions for and relations between the transport coefficients were developed. Their magnitude was estimated by model calculations. (See also W74-10215) (Knapp-USGS)
W74-10216

EFFECT OF SNOWSTORMS ON SNOW TRANSPORT FROM MOUNTAINOUS PLATEAUS (VLIYANIYE METELEY NA S'YEM I PERENOS SNEGA S GORNYKH PLATO),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
I. S. Grishin.
Vodnyye Resursy, No 2, p 195-199, 1974. 2 fig, 1 tab, 2 ref.

Descriptors: *Snow, *Snow cover, *Snow surveys, *Storms, Winds, Curves.
Identifiers: *USSR(Ural Mountains).

To study problems of snow transport from mountainous plateaus, onsite investigations were carried out in the Bol'shaya Khadata Basin in the Polar Urals at the end of the 1970-71 and 1971-72 winter periods. On the basis of studies of snow distribution patterns, relations were obtained between amount of snow transport by storms and size of the plateau and between volume of transported snow accumulated on leeward slopes of the plateau and length of the snowshed area. Total snow transport, calculated in cu m/m, is closely related to snowstorm duration, expressed in hours. The relations obtained are needed to determine quantitative characteristics of snow transport and balance characteristics of snow cover. Similar relations can be obtained for other, higher-altitude and less readily-accessible regions. (Josefson-USGS)
W74-10221

DIVISION OF THE USSR INTO ZONES BASED ON SNOW LOADS ON A HORIZONTAL SURFACE (RAYONIROVANIYE TERRITORII SSSR PO SNEGOVOY NAGRUZKE NA GORIZONTAL'NUYU POVERKHNOST'),
Main Geophysical Observatory, Leningrad (USSR).
M. V. Zavarina, and V. I. Lipovskaya.
Meteorologiya i Gidrologiya, No 9, p 69-71, September 1973. 1 fig, 1 tab, 5 ref.

Descriptors: Snow, *Snow cover, *Surfaces, *Loads(Forces), *Load distribution, Weight, Snow surveys, Snowfall, Water equivalent, Density, Depth, Roofs, Statistical methods, Probability, Maps.
Identifiers: *USSR, *Snow loads.

Regions of the USSR were mapped on the basis of snow-load values on a horizontal surface with a 5-year recurrence interval. Snow loads were calculated from an integral curve of annual water equivalent of snow during a 10-day period of maximum snow depth. The map can be used to calculate snow loads on roofs. Average weights of snow cover (in kg/sq m) in different regions of the country and limits of their variations are tabulated. As a result of a heavy 24-hour snowfall, maximum increase in snow load for 1 day in Kiev was 37 kg/sq m, in Vladivostok--54 kg/sq m, and in Batumi--52 kg/sq m. (Josefson-USGS)
W74-10264

POSSIBILITY OF MAPPING ICE CONDITIONS ON LARGE LAKES FROM SATELLITE IMAGERY (VOZMOZHNOST' KARTIROVANIYA LEDOVOY OBSTANOVKI NA KRUPNYKH OZERAKH PO SNIMKAM S ISKUSSTVENNYKH SPUTNIKOV ZEMLI),
Gosudarstvennyi Gidrologicheski Institut, Leningrad (USSR).
V. G. Prokacheva.
Meteorologiya i Gidrologiya, No 9, p 48-55, September 1973. 3 fig, 2 tab, 6 ref.

Descriptors: *Ice, *Lakes, *Satellites(Artificial), *Remote sensing, *Mapping, Photography, Ice cover, Ice jams, Snow, Data collections.
Identifiers: *USSR, *Lake Ladoga(USSR), *Lake Onega(USSR), *Cartograms, Ice fields.

The Meteor system of Soviet meteorological satellites insures regular inspection of the earth's surface. Televised information from the Meteor meteorological artificial earth satellite was used in a test to obtain information on ice conditions in the vicinity of Lakes Ladoga and Onega. Synchronous cartograms made from aerial reconnaissance of ice conditions on Lake Ladoga were compared with those made from the satellite images. Cartogram comparison demonstrated good compatibility and the possibility of obtaining basic characteristics of winter conditions of the lake from satellite images. A resolution of 1 to 2 km was established between features of lake ice objects on the television images obtained from the Meteor satellite. Television images can be used to study ice conditions of large lakes, reservoirs, and mouths of large rivers. The procedures proposed for compiling cartograms of ice conditions can be used to evaluate state of lake ice cover with respect to open water, ice cover, and ice fields. Raising the resolution capability of television images from the Meteor satellite by at least 5 times and doubling the scale will greatly enhance possibilities of mapping ice conditions on water bodies and of studying their regime. Simultaneous television and infrared imagery should provide reliable observations of ice conditions on inland bodies of water. (Josefson-USGS)
W74-10266

2D. Evaporation and Transpiration

IMPROVING WATER MANAGEMENT EFFICIENCY THROUGH USE OF BIO-INDICATORS,
Kansas Agricultural Experiment Station, Manhattan.
W. L. Powers, R. A. Brady, L. R. Stone, E. T. Kanemasu, and C. D. Nickel.
Available from the National Technical Information Service as PB-233 784 $3.25 in paper copy, $1.45 in microfiche. Kansas Water Resources Research Institute, Manhattan, Contribution No 146, (1974). 39 p, 11 fig, 4 tab, 33 ref. OWRR A-049-KAN(1), 14-31-0001-3516.

Descriptors: *Irrigation practices, *Soybeans, *Evapotranspiration, *Stomata, *Bioindicators, Water management(Applied), Leaves, Soil water, Water utilization, Canopy, *Soil-water-plant relationships.

Relationships between water status of agronomic plants during ontogeny and an array of plant physiological factors were examined in an effort to determine if one or more of these factors could be effective in describing the initial occurrence of crop water deficits and thus be effective in fixing the time of irrigation. The following plant measurements were taken to determine their ability to indicate water need for soybeans: (1) stomatal resistance, (2) leaf water potential, (3) leaf-air temperature difference, and (4) leaf proline content. Various soil water stress conditions were imposed on the soybeans by irrigating at various stages of growth when predetermined soil-moisture-depletion levels were reached. Yield and degree of lodging of the soybeans under the various irrigation treatments were measured and the water use efficiency for each treatment determined. Stomatal resistance and leaf water potential were the only plant parameters for which meaningful relationships for water need were developed. Adaxial stomatal resistance of upper canopy leaves increased rapidly when soil water potentials decreased to near -4 bars. A linear relationship between soil water potential and leaf water potential measured at midday was established. Because there was a significant difference only between the irrigated and non-irrigated treatments and not among irrigation treatments, greatest water use efficiency was obtained by irrigating during the podding stage of growth or when irrigation was initiated at the 60-65% soil-moisture-depletion level in the flowering or vegetative stage. Irrigation initiated in the vegetative stage and at low soil-moisture-depletion levels resulted in lodging which would reduce yields when machine harvested.
W74-09804

PREDICTION OF WATER LOSS FROM A FALLOW FIELD SOIL BASED ON SOIL WATER FLOW THEORY,
Agricultural Research Service, Fort Collins, Colo.
H. R. Gardner.
Soil Science Society of America Proceedings, Vol 38, No 3, p 379-382, May-June 1974. 6 fig, 1 tab, 4 ref.

Descriptors: *Evaporation, *Water loss, *Soil water movement, Equations, Evapotranspiration, Diffusivity, Soil moisture, Water balance.

Evaporation from nonhomogeneous field soils may be predicted by a simple technique based on soil water flow theory. From cumulative evaporation measurements on undisturbed cores of soil, a dimensionless curve is drawn relating fractional water loss to the square root of time divided by the amount of water available for evaporation. A procedure is described to account for the residual water left in the soil from one rainfall event to the next. Predictions of cumulative evaporation made by the use of the dimensionless curve were compared with 4 years of lysimeter data on Rago silt loam. The system should work best in an area with high average potential evaporation and low rainfall such as the Great Plains. (Knapp-USGS)
W74-10218

METHODS OF CALCULATION OF EVAPORATION AND WATER REGIME IN THE ROOT ZONE OF SOIL ON WATERSHED (METODY RASCHETA ISPARENIYA I VODNOGO REZHIMA KORNEOBITAYEMOGO SLOYA POCHVY NA VODOSBORAKH),
A. R. Konstantinov.
Vodnyye Resursy, No 2, p 78-87, 1974. 3 fig, 1 tab, 30 ref.

Descriptors: *Evaporation, *Soil water movement, *Soil moisture, *Soil-water-plant relationships, *Root zone, Watersheds(Basins), Cultivated lands, Heat balance, Water balance, Diffusion, Consumptive use, Plant growth, Crop response, Biology, Equations.
Identifiers: USSR.

Methods are given for calculating evaporation from fields and watersheds, and advantages and disadvantages of the methods as determined by initial data, accuracy of computation, and conditions of application are noted. Present methods of calculating evaporation from soil include the water- and heat-balance methods, the complex method based on simultaneous use of water- and heat-balance items, the method of turbulent diffusion, and calculations of evaporation from meteorological station observation data, biological curves of plant water consumption, and empirical formulas. The concept of evaporativity is discussed, and the relation of evaporation intensity to area of the evaporating surface is investigated. Methods of calculating soil moisture changes as a function of precipitation, air temperature, humidity, biological characteristics of crops, and initial soil moisture content are described. (Josefson-USGS)
W74-10227

RECORDING WATER USE BY MEANS OF DIGITAL EQUIPMENT,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 7B.
W74-10332

RELATION BETWEEN EVAPOTRANSPIRATION RATE AND MAIZE YIELD,
Hebrew Univ., Rehovoth (Israel). Dept. of Agriculture.
D. Hillel, and Y. Guron.
Water Resources Research, Vol 9, No 3, p 743-748, June, 1973. 2 fig, 1 tab, 19 ref.

Descriptors: *Irrigation practices, *Crop response, *Evapotranspiration, Consumptive use, Water requirements, *Corn(Field), Efficiency.
Identifiers: *Israel(Negev region).

Water use efficiency is evaluated in terms of the ratio of dry matter yield to seasonal evapotranspiration. A 5-year maize irrigation experiment was conducted in which the root zone soil moisture balance and crop response were measured in relation to potential and actual evapotranspiration. A threshold evapotranspiration of 250-300 mm was indicated below which production was negligible and above which production rose linearly with the amount of water applied. Water use efficiency increased with higher quantities of irrigation provided that soil aeration was not impeded and potential evapotranspiration was not exceeded. It is concluded that a 'wet' irrigation regime, permitting the drop to transpire at a rate approaching the climatically induced potential and simultaneously preventing the occurrence of moisture deficits, can help to realize the full productivity of the crop. (Skogerboe-Colorado State)
W74-10339

2E. Streamflow and Runoff

REVERSE FLOW ROUTING BY THE IMPLICIT METHOD,
Iowa State Univ., Iowa City. Dept. of Hydraulics and Mechanics.
R. N. Eli, II, J. M. Wiggert, and D. N. Contractor.
Water Resources Research, Vol 10, No 3, p 597-600, June 1974. 6 fig, 4 ref.

Descriptors: *Routing, *Numerical analysis, Hydrographs, Equations, Mathematical models, Flood routing, Reservoir releases.
Identifiers: *Reverse flow routing.

The concept of 'reverse' flow routing in rivers is proposed, in which upstream flow hydrographs are specified from a downstream flow requirement. An example is given of reverse flow routing by the implicit method of solution of the equations of momentum and continuity. Reverse flow routing is further described in the context of the x-t plane. Solutions were not found in all possible directions of computation in the x-t plane. Solutions were found only in the directions of increasing time and decreasing distance (upstream). (Knapp-USGS)
W74-09886

SEASONAL VARIATION OF THE WATER MASS ALONG THE OREGON-NORTHERN CALIFORNIA COAST,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 2K.
W74-09892

RESONANT AND NONRESONANT MOTION IN A SPINDLE-SHAPED BASIN WITH AN ENTRANCE,
Mitchell Coll. of Advanced Education, Bathurst (Australia).
N. D. Thomas, and D. J. Clarke.
Limnology and Oceanography, Vol 19, No 2, p 199-208, March 1974. 6 fig, 7 tab, 14 ref.

Descriptors: *Seiches, *Surges, *Waves(Water), *Harbors, Mathematical models, Numerical analysis, Simulation analysis, Resonance.
Identifiers: *Australia.

Resonant and nonresonant motions in a spindle-shaped basin formed by the intersection of two confocal parabolae were studied. The motions

were assumed to be caused by the formation of a standing wave due to incident wave action through the entrance. The spindle basin was transformed into a square region with two entrances and the modified boundary value problem was solved approximately by the Galerkin method. The trial functions were chosen to satisfy the boundary conditions across the entrances in the square region. The amplification of the incident waves was calculated for the internal points of the spindle basin at various frequencies; those frequencies causing large amplifications were found. The results were applied to Port Kembla Outer Harbor, Australia. (Knapp-USGS)
W74-09893

A PARTIAL AREA MODEL FOR STORM FLOW SYNTHESIS,
Agricultural Research Service, University Park, Pa. Northeast Watershed Research Center.
For primary bibliographic entry see Field 2A.
W74-09907

EFFECT OF SKEWNESS IN THREE STOCHASTIC PENTAD RIVER FLOW MODELS ON CROSSING PROPERTIES OF SYNTHESIZED DATA,
Birmingham Univ. (England). Dept. of Civil Engineering.
N. T. Kottegoda.
Water Resources Research, Vol 10, No 3, p 446-456, June 1974. 10 fig, 3 tab, 27 ref.

Descriptors: *Synthesis hydrology, *Statistical models, Stochastic processes, Statistical methods, Simulation analysis, Regression analysis, Floods, Droughts, Frequency analysis.
Identifiers: *Wye River(England).

Large samples were synthesized through autoregressive, fast fractional noise, and broken line models, based on a practically significant pentad time unit. The method was tested on four stations in the British Wye catchment. Hydrologic characteristics such as the numbers, durations, and magnitudes of droughts and floods were assessed by means of the crossing properties at critical levels in the time series. If a Gaussian distribution is applied to the stochastic component, crossing properties other than surplus run lengths are unrealistic. Compatibility with historical properties is achieved by the incorporation of approximately twice the coefficient of skewness estimated from the original data through a transformation to a gamma function. Also there is agreement in serial correlograms and coefficients of skewness. In this way neither negative numbers nor outliers are generated through autoregressive models. Run lengths at extreme levels in data from all models need adjustment, and a closer fitting distribution function is desirable. (Knapp-USGS)
W74-09909

SURFACE WATER NETWORK DESIGN BY REGRESSION ANALYSIS SIMULATION,
Geological Survey, Reston, Va. Water Resources Div.
M. E. Moss, and M. R. Karlinger.
Water Resources Research, Vol 10, No 3, p 427-433, June 1974. 7 fig, 1 tab, 5 ref.

Descriptors: *Streamflow forecasting, *Regression analysis, *Simulation analysis, *Network design, *Water transfer, Water supply, Statistical models, Inter-basin transfers, Water resources development, Planning, Water management(Applied).
Identifiers: *Regionalization.

Statistical characteristics of the accuracy of regression analyses as used in surface water regionalization were investigated by simulating logarithmic regressions of the streamflow parameters, mean and standard deviation, derived from synthetic streamflow sequences. Accuracy was measured in terms of equivalent years of at-site record. A procedure for design of surface water data networks that accounts for the statistical nature of estimates of parameter accuracy is presented. (Knapp-USGS)
W74-09912

SOME ASPECTS OF AQUATIC INSECT POPULATIONS OF POOLS AND RIFFLES IN GRAVEL BED STREAMS IN WESTERN UNITED STATES,
Geological Survey, Doraville, Ga.
B. W. Lium.
Journal of Research of the U S Geological Survey, Vol 2, No 3, p 379-384, May-June 1974. 3 fig, 4 tab, 8 ref.

Descriptors: *Alluvial channels, *Aquatic insects, *Particle size, Gravels, Water quality, Water pollution effects, Sampling.

Relationships were studied between aquatic-insect populations on rocks of different sizes and variations of populations between different stream localities. All aquatic insects were counted and identified on streambed gravels and cobbles chosen at random from four rivers on three to four types of locations ranging from riffles to pools. The measurements used span 3 to 4 months in 1 year. Insect density (number of insects per unit of rock area) is a function of rock size. Highest insect densities occur on rocks between 45 and 90 mm mean diameter, with larger and smaller rocks having lower insect densities. The insect population differs significantly with location within a stream; that is, from pool to riffle, as well as by stream and season. (Knapp-USGS)
W74-09919

AIRCRAFT MEASUREMENT OF SEA-WAVE PARAMETERS BY THE RADIO-ENGINEERING METHOD (IZMERENIYE PARAMETROV MORSKOGO VOLNENIYA RADIOTEKHNICHESKIM METODOM S LETATEL'NOGO APPARATA),
Taganrogskii Radiotekhnicheskii Institut (USSR).
For primary bibliographic entry see Field 7B.
W74-09933

MOVEMENT OF DEEP WATER IN THE WESTERN BOUNDARY REGION OF THE TROPICAL ATLANTIC (O DVIZHENII GLUBINNYKH VOD V ZAPADNOY POGRANICHNOY OBLASTI TROPICHESKOY ATLANTIKI),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
K. A. Chekotillo.
Akademiya Nauk SSSR Doklady, Vol 210, No 3, p 588-590, 1973. 1 fig, 8 ref.

Descriptors: *Atlantic Ocean, *Deep water, *Ocean currents, *Ocean circulation, Movement, Velocity, Flow rates, Temperature, Salinity, Depth, Profiles.
Identifiers: USSR, *Boundary currents, Countercurrents.

A gigantic system of water transport exists at great depths in the Atlantic Ocean. This system can be represented in the form of two currents at different depths. The upper current flows southwestward from the region of the Straits of Gibraltar toward the central part of the ocean. The lower current originates in Arctic Seas and flows southward. These currents transport North Atlantic Deep Water, the upper layers of which exhibit high salinity and a higher temperature, while the lower layers have a high oxygen content. Analysis of the distribution of current velocity in vertical profiles off South America indicates the existence, at depths of 1,000 to 3,000 m, of a strong current, which transports North Atlantic Deep Water along the South American continent from the Northern to the Southern Hemisphere. (Josefson-USGS)
W74-09937

DYNAMIC STRUCTURE OF THE REGION OF THE ANTILLES-GUYANA COUNTERCURRENT (DINAMICHESKAYA STRUKTURA RAYONA ANTILO-GVIANSKOGO PROTIVOTECHENIYA),
Akademiya Nauk SSSR, Moscow. Istitut Okeanologii.
V. G. Kort, V. A. Bubnov, A. B. Zubin, and K. V. Moroshkin.
Akademiya Nauk SSSR Doklady, Vol 207, No 6, p 1456-1459, 1972. 3 fig, 3 ref.

Descriptors: *Oceanography, *Ocean currents, *Ocean circulation, *Atlantic Ocean, *Surveys, Temperature, Salinity, Velocity, Flow, Maps, Curves.
Identifiers: USSR, *Antilles-Guyana countercurrent, *Boundary currents, Isolines.

Studies made during the 5th voyage of the Soviet research vessel Akademik Kurchatov (February-May 1969) have greatly modified existing theories on the structure of boundary currents in the western part of the North Atlantic. Between February and May 1972 the P. P. Shirshov Institute of Oceanology of the USSR Academy of Sciences undertook an oceanographic expedition (12th voyage of the Akademik Kurchatov) in the western part of the North Atlantic to study the area of origin of the Antilles-Guyana countercurrent and to explore the large-scale space-time variability of western boundary currents. Eight oceanographic traverses were made in the region east of the Antilles Island chain. The average distance between stations on the traverses was 30 nautical miles. Temperture and salinity data for all traverses were used to calculate currents in a geostrophic approximation and to construct dynamic profiles and maps. The zone of western boundary currents exhibits high dynamic instability and perturbations of different scales. The entire system of western boundary currents in the region is clearly identifiable: the Antilles current, the Antilles-Guyana countercurrent, and the left periphery of the Northern Trade Wind current. In the region of its origin, the Antilles-Guyana countercurrent has a width of about 100 miles, a maximum velocity of over 50 cm/sec and a depth of more than 1,000 m. On the basis of repeated observations on traverses northeast of Mayaguana (February 1969 and April 1972) and Guadeloupe (February 1969, December 1970, and March 1972), the dynamic structure of western boundary currents, including the Antilles-Guyana countercurrent, was found to be quasi-stationary, though year-to-year changes in the position of the current lines, velocities, and widths were observed. (Josefson-USGS)
W74-09938

THE PHYSICS OF AIR-SEA INTERACTION,
S. A. Kitaigorodskii.
Available from NTIS, Springfield, Va. 22151 TT72-50062. Price $3.00 printed copy; $1.45 microfiche. Israel Program for Scientific Translations Technical Translation 72-50062, Jerusalem, 1973. 238 p. (Translation of Fizika vzaimodeistviya atmosfery i okeana; Gidrometeoizdat, Leningrad, 1970.)

Descriptors: *Air-water interfaces, *Atmosphere, *Oceans, *Oceanography, *Physics, Energy, Ocean waves, Frequency, Turbulence, Turbulent boundary layers, Mixing, Winds, Drag, Roughness(Hydraulic), Velocity, Temperature, Evaporation, Stratification, Thermocline, Equations.
Identifiers: USSR, Heat exchange.

Physical investigations were made of smallscale interaction between the ocean and atmosphere. Problems of heat exchange computation and modern concepts of wave formation are discussed, and fundamentals of the theory and procedure of computation of wind-induced vertical mixing processes in the surface layer of the sea are described. Experimental data are analyzed and summarized. (Josefson-USGS)

W74-09939

FLOOD PLAIN INFORMATION, OHIO RIVER: MONROE COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09965

FLOOD PLAIN INFORMATION, OHIO RIVER: JEFFERSON COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09966

FLOOD PLAIN INFORMATION, MONONGAHELA RIVER: NORTH CHARLEROI, CHARLEROI, SPEERS, DUNLEVY, ALLENPORT, STOCKDALE, ROSCOE, AND ELCO, WASHINGTON COUNTY, PENNSYLVANIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09967

FLOOD PLAIN INFORMATION, OHIO RIVER: BELMONT COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09968

FLOOD PLAIN INFORMATION, OHIO RIVER: WETZEL COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09969

FLOOD PLAIN INFORMATION, OHIO RIVER: MARSHALL COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09970

FLOOD PLAIN INFORMATION, OHIO RIVER: HANCOCK COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09971

FLOOD PLAIN INFORMATION, OHIO RIVER: COLUMBIANA COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09972

MORPHOGENETIC STUDY OF TERMINAL TRIANGULAR TRACT OF INLAND STREAMS IN SUTLEJ YAMUNA PLAIN,
Punjab Univ., Chandigarh (India).
A. B. Mukerji.
Indian Journal of Power and River Valley Development, Vol 23, No 10, p 314-324, October, 1973. 3 fig, 3 tab, 2 ref.

Descriptors: *Streams, *Geomophology, Plains, Deltas, Landscape, Terrain analysis, Channels, Rivers, Topography, Topography, Investigations, Field investigations, Inland streams, *Channel morphology.
Identifiers: Multifurcation, Divergence, *India(Sutlej-Yamuna plain).

The purpose was to identify and describe a unit feature termed terminal triangular tract. This is a geomorphic landscape unit characterized by its triangular deltaic shape formed by a dichotomic pattern of distributaries and which is evolved as a consequence of multi-furcation of the main channel. Also shown is an empirical genetic interpretation in terms of the geometry of distributary network, surface material, terrain attributes, human interference, and local topographic details. Based on field investigations, aerial photographs and topographical sheets, the Sutlej-Yamuna plains are described. The size of the feature is correlated with the size and discharge of the stream, the angle of divergence, frequency of divergence and number of lower order distributaries. The texture of topography is finer near the points of divergence and becomes coarser away from them. The network tends to become progressively more elaborate and complicated through time. (Prague-FIRL)
W74-10052

STABILITY OF LAMINAR FLOW AT SEABED,
Cambridge Univ. (England). Dept. of Engineering.
J. F. A. Sleath.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers Vol 100, No WW2, Paper 10512, p 105-122, May 1974. 10 fig, 13 ref, append.

Descriptors: *Laminar flow, *Ocean currents, *Turbulence, Coastal engineering, Currents(Water), Hydrodynamics, Oceanography, Waves(Water), Ocean waves, *Boundary layers, *Reynolds number.

The flow produced by water waves in the laminar boundary layer above a two-dimensional rough bed was studied analytically. At low Reynolds numbers the fluid drifts in closed recirculating cells, without dispersion. At high Reynolds numbers, vortex formation occurs for large-scale roughness and sudden jets of fluid are produced at a certain point in each half-wave cycle with small-scale roughness. In both cases there is vigorous mixing close to the bed. The similarity between this mixing and that described as turbulence suggests that the results of this study may be applied to the problem of transition in oscillatory boundary layers. (Knapp-USGS)
W74-10220

RELATION OF SEASONAL DISTRIBUTION OF RUNOFF TO FLUCTUATIONS IN ANNUAL DISCHARGE (OBUSLOVLENNOST' VNUTRIGODOVOGO RASPREDELENIYA STOKA KOLEBANIYAMI VODNOSTI GODA),
Moscow State Univ. (USSR).
V. D. Bykov, and V. N. Busarov.
Vodnyye Resursy, No 2, p 191-194, 1974. 1 fig, 1 tab, 11 ref.

Descriptors: *Runoff, *Discharge(Water), *Annual, *Seasonal, *Fluctuations, Variability, Frequency, Correlation analysis.
Identifiers: USSR, Spectral analysis.

To study the relation of seasonal distribution of runoff to total annual discharge, the index of coherence was used. This index was based on estimates of the mutual correlation of the processes examined. Fluctuations in the parameters of seasonal variability of runoff were determined by fluctuations in annual discharge. On rivers with a small variability of annual runoff, a close relation between processes is typical of a wide range of frequencies (from 2-3 to 11-12 years). On rivers with a variation in annual runoff greater than 0.4, fluctuations in the parameters of seasonal distribution of runoff are dependent on fluctuations in annual discharge only in the low-frequency region. (Josefson-USGS)
W74-10222

THE EFFECT OF TOPOGRAPHY AND WATER EROSION ON RUNOFF (VLIYANIYE REL'YEFA I VODNOY EROZII NA STOK),
Odessa State Univ. (USSR).
For primary bibliographic entry see Field 2J.
W74-10228

SYSTEMS OF A WIND-WAVE FIELD (SISTEMY POLYA VETROVYKH VOLN),
Gosudarstvennyi Proektno-Izyskatelskii i Nauchno-Issledovatelskii Institut Morskogo Transporta 'Soyuzmorniiproekt', Moscow (USSR).
Yu. M. Krylov, V. V. Kuznetsov, and S. S. Strekalov.
Akademiya Nauk SSSR Doklady, Vol 208, No 4, p 958-961, 1973. 2 fig, 19 ref.

Descriptors: *Oceanography, *Waves(Water), *Gravity waves, *Winds, *Velocity, Wind velocity, Resonance, Wavelengths, Frequency, Laboratories, Lakes, Reservoirs, Oceans.
Identifiers: USSR, *Wind waves.

Based on measurements in deep natural and artificial bodies of water, two fundamental and basically different systems of gravity waves were found to develop regularly under steady wind. Under natural conditions, this phenomenon is manifested very clearly in reservoirs at small distances from shore under weak offshore winds, when wavelengths of the two fundamental systems differ by several fold, and there is virtually no disturbance from neighboring waters. The system with a phase velocity equal to wind velocity is referred to as the resonant system and that with a lesser velocity, the subresonant system. Phase velocity of the resonant system is equal to wind velocity, while that of the subresonant system increases rapidly with distance from the shore and reaches a limit approximately equal to 0.8 of wind velocity. The subresonant system reaches energy saturation comparatively rapidly, while the resonant system continues to develop. In addition to the two main systems, a third, supraresonant system with a phase velocity greater than wind velocity also develops. The physical cause of development of this system is the nonlinear interaction between the two main systems. The subresonant system predominates in the laboratory and on lakes and reservoirs; the resonant and subresonant systems dominate in seas; and the supraresonant, resonant, and subresonant systems in oceans. (Josefson-USGS)
W74-10258

DETERMINATION OF HEAT AND WATER VAPOR FLOWS IN THE OCEAN-ATMOSPHERE SYSTEM BASED ON DATA OF OBSERVATIONS OF TEMPERATURE PROFILES IN A THIN SURFACE LAYER OF THE SEA (K VOPROSU OPREDELENIYA POTOKOV TEPLA I VODYANOGO PARA V SISTEME OKEAN-ATMOSFERA PO DANNYM NABLYUDENIY PROFILEY TEMPERATURY V TONKOM POVERKHNOSTNOM SLOYE MORYA),
Moscow State Univ. (USSR).
G. G. Khundzhua, and Ye. G. Andreyev.
Akademiya Nauk SSSR Doklady, Vol 208, No 4, p 841-843, 1973. 1 fig, 13 ref.

Descriptors: *Air-water interfaces, *Water vapor, *Heat flow, *Temperature, *Profiles, Surfaces, Boundary layers, Thermal conductivity, Thermal stratification, Thermocline.
Identifiers: *USSR(Black Sea), Heat exchange, Mass exchange.

The problem of determining heat and mass exchange in the ocean-atmosphere system is reduced to a determination of temperature gradients in a thin surface layer of the sea. Full-scale observations were conducted during the summer and autumn of 1969-71 aboard the Soviet research vessel Moskovskiy Universitet on the Black Sea at points 30 miles from shore. A series of daily recordings of temperature profiles in the surface layer were obtained. A thin, cold time-stable film with a thickness of 0.002 to 0.005 m and a 2 to 3 deg C temperature drop exists in the surface layer both in a daytime and at night. The cold surface film was recorded up to sea states of 3. Calculation of selected temperature profiles for the

Black Sea in August gives a latent heat flux density of the order of 110 watts/sq m. Corresponding evaporation rates in August average 0.3 cm/day. (Josefson-USGS)
W74-10259

VERTICAL MESO- AND MICROSTRUCTURE OF OCEAN CURRENTS (O VERTIKAL'NOY MEZO- I MIKROSTRUKTURE OKEANICHESKIKH TECHENIY),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
A. S. Monin, K. N. Fedorov, and V. P. Shevtsov.
Akademiya Nauk SSSR Doklady, Vol 208, No 4, p 833-836, 1973. 3 fig, 9 ref.

Descriptors: *Geophysics, *Oceanography, *Ocean currents, *Current meters, Velocity, *Flow measurement, Profiles, Thermodynamics, Measurement, *Pacific Ocean.
Identifiers: USSR, Hodographs(Oceanography).

To measure current velocity, a new current meter was designed at the Pacific Ocean Division of the USSR Academy of Science's Institute of Oceanology. More than 30 series of simultaneous measurements were made of vertical profiles of current velocity and thermodynamic variables. The current velocity is accurate to within +0.5 cm/sec, the measurement having almost zero lag. The current direction is accurate to within +3 deg and the depth to within +0.25%. The measurement technique is promising, and the conclusions drawn, though preliminary, indicate the presence of at least a well-defined mesostructure on current-velocity vertical profiles and of a relation of mesostructure to vertical inhomogeneities of thermodynamic parameters. (Josefson-USGS)
W74-10260

EFFECT OF EQUATORIAL ROSSBY WAVES ON STATIONARY CURRENTS (O VLIYANII EKVATORIAL'NYKH VOLN ROSSBI NA STATSIONARNYYE TECHENIYA),
Akademiya Nauk URSR, Sevastopol. Marine Hydrophysics Inst.
D. U. Vapnyar.
Akademiya Nauk SSSR Doklady, Vol 208, No 4, p 829-832, 1973. 1 fig, 6 ref.

Descriptors: *Geophysics, *Oceanography, *Waves(Water), *Currents(Water), *Winds, Hydrodynamics, Equations.
Identifiers: USSR, *Rossby waves.

The problem of calculating equatorial Rossby waves generated by a periodic wind and of equatorial stationary currents which are a secondary effect of purely periodic wind is considered. Equatorial stationary currents generated by a periodic wind may be significant even at small-amplitude tangential wind stresses and exhibit a number of features characteristic of Cromwell and Lomonosov currents. Distribution of the zonal velocity component of a stationary current in a cross section intersecting the equator is diagrammed. (Josefson-USGS)
W74-10261

SOME PATTERNS OF VARIATIONS IN AVERAGE MONTHLY RIVER AND GROUNDWATER LEVELS IN THE PRIPYAT' POLES'YE REGION (NEKOTORYYE ZAKONOMERNOSTI IZMENENIYA SREDNEMESYACHNYKH UROVNEY REK I PODZEMNYKH VOD NA TERRITORII PRIPYATSKOGO POLES'YA),
For primary bibliographic entry see Field 4A.
W74-10263

WATER RESOURCES DATA FOR TEXAS, 1973: PART 1. SURFACE-WATER RECORDS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-10268

EVOLUTION OF THE SON DRAINAGE,
Saugar Univ. (India). Centre of Advanced Study in Geology.
For primary bibliographic entry see Field 2J.
W74-10285

2F. Groundwater

THE TRANSMISSIVITY ITERATIVE PROGRAMS ON THE PDP-9 COMPUTER - A MAN-MACHINE INTERACTIVE SYSTEM,
Battelle-Pacific Northwest Labs., Richland, Wash. Mathematics Dept.
L. E. Addison, D. R. Friedrichs, and K. L. Kipp.
Avail: NTIS, Springfield, Va., as Rept. No. BNWL-1707, $5.45/copy, $1.45/microfiche. Report No. BNWL-1707, 1973. 67 p, 14 fig, 4 tab, 14 ref, 4 append.

Descriptors: *Transmissivity, *Groundwater movement, *Base flow, *Model studies, *Systems analysis, Analytical techniques, Computer program, Movement.

A system of computer programs, The Transmissive Iterative Sequence, has been written with the purpose of providing an analytical aid in the simulation of groundwater flow. This man-machine interactive system directly involves the user making decisions in the analysis loop. Because of the limited amount of data available, this analysis loop is highly iterative in nature and its success depends on the ability to rapidly input and output information in a form directly related to the groundwater system being analyzed. The Iterative Sequence provides these analytical capabilities in a self-contained computer package which constitutes a useful tool for modeling a groundwater system. (Houser-ORNL)
W74-09825

STOCHASTIC ANALYSIS OF PHREATIC AQUIFERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
L. W. Gelhar.
Water Resources Research, Vol 10, No 3, p 539-545, June 1974. 6 fig, 19 ref.

Descriptors: *Surface-groundwater relationships, *Statistical models, *Stochastic processes, Alluvial channels, Recharge, Discharge(Water), Water table, Water level fluctuations.
Identifiers: *Phreatic aquifers.

Three analytical models were developed to describe the spectral response characteristics of phreatic aquifers subject to time variable accretion and fluctuations in adjacent stream stage. A linear reservoir model approximates the behavior of a more complete distributed linear model based on the Dupuit approximation if a single parameter is adjusted appropriately. A linearized two-dimensional analysis including the effects of vertical flow shows, under conditions of large anisotropy with relatively narrow partially penetrating streams, differences from the Dupuit analysis that may be important under some field conditions. Possible applications of the results in aquifer evaluation are suggested. (Knapp-USGS)
W74-09882

MATHEMATICAL SIMULATION OF THE SUBSIDENCE OF VENICE 2. RESULTS,
Centro di Ricerca IBM di Venezia (Italy).
G. Gambolati, P. Gatto, and R. A. Freeze.
Water Resources Research, Vol 10, No 3, p 563-577, June 1974. 22 fig, 6 tab, 14 ref.

Descriptors: *Subsidence, *Withdrawal, *Mathematical models, Land subsidence, Water levels, Hydrogeology, Industrial water, Artesian aquifers.
Identifiers: *Italy(Venice).

Land subsidence at Venice is the result of aquitard compaction caused by extensive groundwater withdrawals from the unconsolidated Quaternary aquifer-aquitard system that underlies the Venetian lagoon. A two-step mathematical model consisting of a regional hydrologic model and a local subsidence model was used to analyze the system. The total subsidence over the period 1930-1973 has been about 15 cm. Geodetic records, which cover only the latter portion of this period, provide documentary evidence for a 10-cm subsidence during 1952-1969. Simulations of the past used to calibrate the model show that extractions from a single large well in the Tronchetto region of Venice have exerted a small but measurable influence on the subsidence, but the main responsibility for subsidence at Venice must be placed in the heavy industrial pumpage at the mainland port of Marghera. Predictive simulations show that any changes in the withdrawal rate at Marghera will tend to propagate their effects to Venice in a relatively short time, and there will be little delay between the occurrence of head declines at Venice and the resulting subsidence. If withdrawals at Tronchetto and Marghera are kept constant in the future as they have been since 1969, about 3 cm of further subsidence can be expected. Subsidence could be arrested at its present level by a shutdown of the Tronchetto well and a reduction of Marghera pumpage to three quarters of its present value. Complete cessation of all pumping would provide a modest rebound of about 2 cm over the next 25 years. The model was limited by the requirements of radial symmetry and a calibration that was hampered by the spareness of the available data. (See also W73-10663) (Knapp-USGS)
W74-09884

THE KARSTIC GROUNDWATER BASINS OF THE KAIBAB PLATEAU, ARIZONA,
Wyoming Univ., Laramie. Dept. of Geology.
P. W. Huntoon.
Water Resources Research, Vol 10, No 3, p 579-590, June 1974. 7 fig, 4 tab, 26 ref.

Descriptors: *Karst hydrology, *Arizona, *Groundwater basins, Groundwater movement, Springs, Flow nets, Karst, Limestones, Hydrogeology.
Identifiers: *Kaibab Plateau(Ariz).

The Kaibab plateau north of the Grand Canyon is characterized by the absence of live surface streams because most of the surplus water drains through the groundwater system. Over 95% of the primary porosity that can be attributed to the 4000-ft sequence of Paleozoic sediments under the plateau occurs in the upper 900 ft of the section. However, almost all the water that discharges from the region exits through perennial karst springs developed in carbonates 3000 ft below the rims of the Grand Canyon and the Marble Canyon. The locations of these springs are fault- and joint-controlled, and they drain between 65 and 97% of the area underlying the Kaibab plateau. The relatively permeable upper Paleozoic rocks in the section collect and transmit water to fault zones where the water enters regional drains dissolved along fractures in the lower carbonates. Flow in the fault zones is largely unconfined and perched above an impermeable shale unit that underlies the lower carbonates. Consequently, the areal extent of the groundwater basins that drain the Kaibab plateau as well as potential saturated zones along the faults can be delineated by using gradients taken from a structural contour map of the top of the shale. (Knapp-USGS)
W74-09885

A DATA ACQUISITION SYSTEM FOR TRANSIENT POROUS MEDIA EXPERIMENTS IN A SECTOR TANK,
California Univ., Davis. Dept. of Water Science and Engineering.
A. Orhun, and J. N. Luthin.
Water Resources Research, Vol 10, No 3, p 601-604, June 1974. 6 fig, 1 ref.

Descriptors: *Unsteady flow, *Groundwater movement, Data collections, Permeameters, Porous media, Hydraulic models, Piezometers, Data processing.

A simple, fast, and reliable data acquisition system was designed to study groundwater flow problems under transient conditions. The data needed include soil water pressure at various locations and the outflow from the well. A sector tank was constructed for the experimental verification of the computer solutions. The grid of pressure tap points was chosen in such a way that interpolations for the equipotentials deviating from vertical lines could easily be made along the diagonals of the network. All the pressure measurements were made by piezometers constructed from 1/4-inch stainless steel tubings. (Knapp-USGS)
W74-09887

SENSITIVITY ANALYSIS OF INPUT PARAMETERS IN NUMERICAL MODELING OF STEADY STATE REGIONAL GROUNDWATER FLOW,
Geulph Univ., (Ontario). Dept. of Land Resource Science.
R. W. Gillham, and R. N. Farvolden.
Water Resources Research, Vol 10, No 3, p 529-538, June 1974. 9 fig, 15 ref.

Descriptors: *Numerical analysis, *Groundwater movement, *Groundwater basins, Mathematical models, Finite element analysis, Hydraulic conductivity.
Identifiers: *Sensitivity analysis.

To study regional groundwater flow, a finite element model was used to examine the sensitivity of computed hydraulic head values to changes in the hydraulic conductivity. Steady state saturated flow in non-uniform anisotropic cross sections was considered. The sensitivity analysis procedure was useful in locating those areas of the flow system most sensitive to changes in conductivity and in determining those components of conductivity that have the greatest effect on the hydraulic head distribution. Consequently, a sensitivity analysis is very useful in designing efficient hydraulic conductivity measurement programs. One method that has frequently been used to determine conductivities is to adjust the conductivity components in a numerical model until the computed head value agree with field measurements; this procedure could lead to erroneous conclusions. By using sensitivity analyses, a method was developed for determining the quantitative value of ratios of conductivity components from field measurements of hydraulic head. In principle, the number of head measurements must be equal to the number of unknown conductivity ratios. (Knapp-USGS)
W74-09900

A CONCEPTUAL MODEL OF HYSTERESIS,
Technion - Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2G.
W74-09902

GEOCHEMICAL INDICATORS OF SUBSURFACE TEMPERATURE--PART 1, BASIC ASSUMPTIONS,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2K.
W74-09914

GEOCHEMICAL INDICATORS OF SUBSURFACE TEMPERATURE--PART 2, ESTIMATION OF TEMPERATURE AND FRACTION OF HOT WATER MIXED WITH COLD WATER,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2K.
W74-09915

THE CALCULATION OF AQUIFER CHEMISTRY IN HOT-WATER GEOTHERMAL SYSTEMS,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 2K.
W74-09916

OCCURRENCE OF DISSOLVED ORGANIC CARBON IN SELECTED GROUND-WATER SAMPLES IN THE UNITED STATES,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5B.
W74-09917

GROUNDWATER OF SIBERIA AND SOVIET FAR EAST (PODZEMNYYE VODY SIBIRI I DAL'NEGO VOSTOKA),
A. A. Dzyuba, and Ye. V. Pinneker.
Akademiya Nauk SSSR Vestnik, No 3, p 105-106, March 1974.

Descriptors: *Conferences, *Groundwater, Hydrogeology.
Identifiers: *USSR(Siberia), Soviet Far East.

The Seventh Conference on Groundwater of Siberia and Soviet Far East was held at Novosibirsk, September 24-28, 1973. The conference was sponsored by the Commission on the Study of Groundwater of Siberia and Soviet Far East, Institutes of the Earth's Crust and Hydrodynamics of the Siberian Division of the USSR Academy of Sciences, and by the Novosibirsk Geological Administration. Participants in the conference included representatives of institutes of the USSR Academy of Sciences and of the Siberian Division of the USSR Academy of Sciences, geological administrations in eastern regions of the country, research institutes of a number of Union republics, ministries, and departments, and of higher educational establishments. A total of 220 delegates attended the conference and 68 papers were presented. Discussions focused on theoretical problems of modern hydrogeology associated with basic trends in its development, formation and composition of groundwater, and with the hydrologic cycle. The importance of measures to protect groundwater from depletion and contamination was noted, and considerable attention was given to artificial groundwater replenishment. Development of methods to control natural-water resources in Siberia and Soviet Far East was stressed. Applied problems included use of fresh groundwater for water supply, inundation of oil fields and mines, land reclamation, and application of mineral waters for therapeutic purposes. (Josefson-USGS)
W74-09936

LONG ISLAND WATER,
H. Lang.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 211-236, 1973. 2 fig, 5 tab, 29 ref, 2 append.

Descriptors: Groundwater, *Groundwater availability, Groundwater resources, *Groundwater recharge, *Water supply development, Desalinations, Water pollution treatment, Cost comparisons, Projections, *New York, Hydrologic systems, Water demand, Nitrates, Correlation analysis, Wells.
Identifiers: *Long Island(N.Y.), *Nassau County(N.Y.), Suffolk County(N.Y.), 1980 water quality projections.

Nassau and Suffolk Counties derive their water supply from the large groundwater reservoir beneath Long Island. Although close geographically, the two counties have very dissimilar water problems. Highly sewered Nassau County faces a diminishing water supply, whereas Suffolk County, relying heavily on cesspools, has water quality problems. Two aquifers supply the area. The uppermost or glacial aquifer is large and readily accessible. Below it, the Magothy Aquifer is even larger and provides 80% of the Long Island groundwater supply. The most significant source of contamination originates in cesspool leaching of detergent additives and nitrates, however this problem is only prevalent in Suffolk County, where only 4% of the residences are sewered. As a result certain detergents have been banned by the Suffolk County Legislature. An estimate of the rainfall over the area yields 800 plus or minus 200 MGD as the amount of precipitation that will replenish the ground water supply. Correlating population with amount of withdrawal for Nassau and Suffolk Counties illustrates that Nassau County will exceed its safe yield of 170 MGD by 1979, mainly due to the loss in recharge capabilities as cesspolls are replaced by sewer systems. Of the various options for developing new water supply, the recharging of the groundwater aquifers with quaternary treated effluent appears to have decided advantages over desalination, or buying from surrounding areas like New York City which are already seedking their own new sources. Suffolk County should have no problem with water supply for many years to come. (See also W74-09964) (LaPointe-North Carolina)
W74-09961

SIMULATION OF ALLUVIAL FAN DEPOSITION BY A RANDOM WALK MODEL,
Geological Survey, Reston, Va. Water Resources Div.
W. E. Price, Jr.
Water Resources Research, Vol 10, No 2, p 263-274, April, 1974. 13 fig, 34 ref.

Descriptors: *Alluvial fans, *Groundwater, Geology, Aquifers, *Model studies, Simulation analysis, Stochastic processes, Flow, Gradients, Data collection, Computer models, Geologic mapping, Maps, *Acquifer characteristics.
Identifiers: *Random walk model, Simulated flows, Digital models.

Alluvial fans are an important source of groundwater and knowledge of spatial variations in the permeability of water-bearing beds in alluvial beds to geologic processes is useful to estimate aquifer parameters. This model aids in the development of data collection systems, the estimation of aquifer parameters in undeveloped areas, better interpretation of aquifer tests, and improvement in the accuracy of test-hole correlations. The results suggest that a digital model based on a random walk may be used to simulate alluvial fan deposition. The model is in three dimensions, is dynamic in time and space, and employs two independent stochastic events: an uplift of the moutain basin contributing sediments and a storm large enough to result in fan deposition. A random walk, each step governed by the gradient and momentum of flow, determines the pattern of deposition. Results of the simulation are printed as geologic maps and sections. The general form of the simulated deposits is that of an alluvial fan, the pattern of simulated flows resembles that of real flows, and fan facies show a concentration of debris flows near the apex and a particle size decrease in water flow deposits downfan. (Prague-FIRL)
W74-10054

METHOD WITH RADIOTRACERS AND EXPERIMENTS IN HYDROCARST STRUCTURES,
Academia R. S. R., Bucharest. Institutul de Fizica Atomica.
For primary bibliographic entry see Field 5A.
W74-10108

CALCITIZATION OF EDWARDS GROUP DOLOMITES IN THE BALCONES FAULT ZONE AQUIFER, SOUTH-CENTRAL TEXAS.
California State Univ., San Diego. Dept. of Geological Sciences.
P. L. Abbott.
Geology, Vol 2, No 7, p 359-362, July 1974. 2 fig.

Descriptors: *Hydrogeology, *Karst hydrology, *Texas, *Dolomite, Limestones, Carbonate rocks, Water chemistry, Leaching, Weathering, Aquifer characteristics, Faults(Geologic).
Identifiers: *Edwards Limestone(Texas), Balcouer Fault Zone(Tex).

A high-storage cavernous aquifer is developed in the Cretaceous Edwards Limestone within the Miocene Balcones fault zone. The trend of the fault system, and that of its contained aquifer, cuts across the depositional facies of the Edwards Limestone. The Edwards Limestone west of the Fault zone and east of the downdip boundary of the main aquifer contains significantly higher percentages of dolomite than similar depositional facies within the fault zone aquifer. The large amount of groundwater with a high Ca/Mg ratio which has passed through the artesian aquifer in the Edwards Group has calcitized many of the dolomite beds. (Knapp-USGS)
W74-10208

ARTIFICIAL REPLENISHMENT OF GROUNDWATER STORAGE (OBISKUSSTVENNOM VOSPOLNENII ZAPASOV PODZEMNYKH VOD),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenerno Geologii, Moscow (USSR).
For primary bibliographic entry see Field 4B.
W74-10223

RADIOCARBON AND TRITIUM EVIDENCE FOR DIRECT RAIN RECHARGE TO GROUND WATERS IN THE NORTHERN KALAHARI,
University of the Witwatersrand Johannesburg, (South Africa). Nuclear Physics Research Unit.
B. T. Verhagen, E. Mazor, and J. P. F. Sellschop.
Nature, Vol 249, No 5458, p 643-644, June 14, 1974, 2 fig, 1 tab, 9 ref.

Descriptors: *Recharge, *Water balance, *Deserts, Africa, Sands, Infiltration, Evaporation, Tracers, Tritium, Radioactive dating, *Carbon radioisotopes, *Rainfall-runoff relationships.
Identifiers: *South Africa(Kalahari Desert).

Recharge occurs in areas of the Kalahari which are covered with sand. A controlling factor is the annual amount of precipitation, which averages 450 mm in the north, gradually decreasing to 250 mm in the south. In addition, the seasonal variability of annual rainfall with the occasional high rainfall outliers (such as the seasons of 1966-67 and 1973-74) is of extreme importance for recharge. The Kalahari, a flat and sand-covered region of more than 600,000 sq km is classified as a desert because of the virtual absence of surface waters in the form of springs or perennial rivers. Both the radiocarbon and tritium data lead to the conclusion that ground waters in the northern Kalahari are directly, and in some cases rapidly, recharged by rain. Balanced exploitation could make room for additional recharge which is partly lost to evapotranspiration from the often shallow water tables. Even at values of rainwater infiltration as low as 5% this could still constitute a significant managed ground water supply. (Knapp-USGS)
W74-10250

SOME PATTERNS OF VARIATIONS IN AVERAGE MONTHLY RIVER AND GROUNDWATER LEVELS IN THE PRIPYAT' POLES'YE REGION (NEKOTORYYE ZAKONOMERNOSTI IZMENENIYA SREDNEMESYACHNYKH UROVNEY REK I PODZEMNYKH VOD NA TERRITORII PRIPYATSKOGO POLES'YA),
For primary bibliographic entry see Field 4A.
W74-10263

ISOTOPIC AND CHEMICAL CHARACTERISTICS OF HIGH-LEVEL GROUNDWATER ON OAHU, HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 4B.
W74-10273

EFFECTS OF LANDFILL DISPOSAL OF CHEMICAL WASTES ON GROUNDWATER QUALITY,
Minnesota Univ., Minneapolis. School of Public Health.
For primary bibliographic entry see Field 5B.
W74-10278

2G. Water In Soils

INTERFACIAL INTERACTION OF WATER AND SILICATE MINERALS,
Missouri Univ., Kansas City. Dept. of Physics.
For primary bibliographic entry see Field 2K.
W74-09805

PREDICTING OPTIMUM DEPTH OF PROFILE MODIFICATION BY DEEP PLOWING FOR IMPROVING SALINE-SODIC SOILS,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
W. W. Rasmussen, and B. L. McNeal.
Soil Science Society of America Proceedings, Vol 37, No 3, p 432-437, May-June, 1973. 2 fig, 3 tab, 14 ref.

Descriptors: *Saline soils, *Deep tillage, *Hydraulic conductivity, Permeability, Soil management, Infiltration.
Identifiers: Deep plowing.

A previously developed procedure for predicting the effect of mixed-salt solutions on soil hydraulic conductivity (HC) was used to predict the relative hydraulic conductivity (RHC) of separate soil horizons from saline-sodic soils, using a standard low-salt solution following a standard high-salt solution at a fixed exchangeable-sodium level. These values were then used to predict the RHC of mixtures of the same horizons simulating profiles modified to various depths by deep plowing. Weighing RHC values for individual horizons by the depth fraction of each horizon in the soil mixture provided RHC values of proper magnitude, except when large proportions of calcareous subsolum material were incorporated into the mixture. Results were improved by multiplying calculated RHC values for each soil mixture by the initial HC of the mixture. Results were consistent with lysimeter and field plot observations on the same soils, including deep plowing trials. (Skogerboe-Colorado State)
W74-09812

EFFECT OF SURFACE DRAINAGE ON WATER TABLE RESPONSE TO RAINFALL,
North Carolina State Univ., Raleigh. Dept. of Biological and Agricultural Engineering.
R. W. Skaggs.
Paper No 72-732 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972, Chicago, Illinois. 23 p, 10 fig, 4 tab, 15 ref.

Descriptors: *Drainage, *Surface drainage, Crop response, Soil water, *Water table, Rainfall, Soil water movement, Drainage engineering, *Loam.

A method for determining the effect of surface drainage on the water table response to rainfall is presented and used to predict water table rise on a Lumbee sandy loam. Predicted results were in good agreement with actual measurements. Approximate methods for implementing the method are presented and discussed. (Skogerboe-Colorado State)
W74-09813

DRAINAGE AND WATER MANAGEMENT IN HUNGARY,
Agricultural Research Service, Riverside, Calif.
W. W. Donnan, and G. Jaranyi.
Paper No 72-704 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972. Chicago, Illinois. 9 p, 5 ref.

Descriptors: *Drainage, *Water management(Applied), Surface drainage, Subsurface drainage, Tile drainage, Irrigation practices, Irrigation systems.
Identifiers: *Hungary.

Hungary has embarked on an ambitious program to develop it's soil and water resources. Progress to date is described with emphasis on the work in the drainage field. (Skogerboe-Colorado State)
W74-09816

DEVELOPMENT OF BI-LEVEL DRAINAGE THEORY,
South Dakota State Univ., Brookings.
For primary bibliographic entry see Field 4A.
W74-09817

LITTER AND SOIL MICROBIAL DYNAMICS IN A DECIDUOUS FOREST STAND,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-09823

MANAGEMENT OF SOLID RADIOACTIVE WASTES,
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-09874

APPROXIMATING SOIL MOISTURE CHARACTERISTICS FROM LIMITED DATA: EMPIRICAL EVIDENCE AND TENTATIVE MODEL,
Geological Survey, Denver, Colo. Water Resources Div.
I. S. McQueen, and R. F. Miller.
Water Resources Research, Vol 10, No 3, p 521-527, June 1974. 6 fig, 43 ref.

Descriptors: *Soil moisture, *Moisture content, Adsorption, Capillary action, Equations, Moisture tension, *Moisture stress.
Identifiers: Soil moisture characteristic.

The soil moisture characteristic can be approximated from limited data as a composite of segments that are simple logarithmic relations. From available data, three segments are evident: (1) a capillary segment from saturation to pF 2.5, (2) an absorbed film segment covering the stress range from about pF 2.5 to about 5.0, and (3) a tightly absorbed segment that extends from pF 5.0 to 7.0. (Knapp-USGS)
W74-09901

A CONCEPTUAL MODEL OF HYSTERESIS,
Technion - Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
Y. Mualem.
Water Resources Research, Vol 10, No 3, p 514-520, June 1974. 12 fig, 14 ref, 1 append.

Descriptors: *Capillary action, *Hysteresis, *Soil water movement, *Wetting, *Drying, Soil moisture, Porous media, Saturated flow, Unsaturated flow, Equations, Model studies.

A conceptual model of the capillary hysteresis phenomenon is suggested. The advantage of this model is that all scanning curves are derived with the aid of simple functions from the main drying curve and the main wetting curves solely. The

model takes into account a reversible part of the process. A simple method of predicting the first drying curve and the scanning curves branched out of the first drying curve is also proposed. The model is often in more satisfactory agreement with measurements for cases in which the prediction based on the Neel-Everett model is poor. The suggested method can be used for solving problems in which hystersis plays a significant role. (Knapp-USGS)
W74-09902

THE SOIL CREEP--CURVED TREE FALLACY,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 2J.
W74-09918

HEAT TRANSFER MODELS FOR A SUBSURFACE, WATER PIPE, SOIL-WARMING SYSTEM,
Arkansas Univ., Fayetteville. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W74-09921

HYDRAULIC DRAG DURING INFILTRATION OF WATER IN A SOIL VEGETATIVE LAYER (GIDRAVLICHESKIYE SOPROTIVLENIYA PRI FIL'TRATSII VODY V RASTITEL'NOM SLOYE POCHVY),
Moskovskii Inzhenerno-Stroitel nyi Institut (USSR).
A. D. Al'tshul', and Nguen Tay.
Meteorologiya i Gidrologiya, No 12, p 77-84, December 1973. 4 fig, 1 tab, 5 ref.

Descriptors: *Infiltration, *Vegetation effects, *Slopes, *Drag, *Flow resistance, Flow, Flow friction, Flow rates, Velocity, Reynolds number, Dimensional analysis, Hydraulic similitude, Model studies, Equations.
Identifiers: USSR.

Flow friction drag in a soil vegetative layer is determined by the state of slope surface, depth and velocity of flow over slopes, water temperature, and the degree to which the surface is covered with vegetation. Two typical cases of movement are considered: (1) flow of water over a slope covered with vegetation composed of rigid stalks, whose height is greater than the depth of water; and (2) flow of water over a slope covered with vegetation composed of rigid stalks, whose height is less than the depth of water. Flexibility of the plant stalks has a significant effect on the magnitude of hydraulic drag during movement of water over slopes with vegetal cover. During movement of water over these slopes, three flow regimes can occur: laminar, transitional, and turbulent. The boundary between these regimes is determined by critical values of the Reynolds number, which considers, in addition to hydraulic flow characteristics, the characteristics of the vegetal cover of the slope. Generalized formulas, obtained as a result of considering flow of water in channels lined with vegetation as an infiltration problem, were proposed for determining the drag coefficient during flow of water over slopes with vegetal cover. The similitude criterion was obtained for simulating movement of water over these slopes (the so-called flexibility criterion of the stalks) on the basis of the modulus of elasticity and moment of inertia of plant stalks and the depth and mean velocity of flow. Relationships are recommended for determining underwater height of stalks in different cases of water movement over slopes with vegetal cover. (Josefson-USGS)
W74-09931

RETENTION OF RADIONUCLIDES DEPOSITED IN THE CHALK RIVER NUCLEAR LABORATORIES WASTE MANAGEMENT AREAS,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
For primary bibliographic entry see Field 5B.
W74-10118

PERCOL USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resource Dept.
For primary bibliographic entry see Field 5B.
W74-10123

FAILURE OF 307 BASIN TRANSFER LINE AND RESULTANT GROUND CONTAMINATION,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 5B.
W74-10127

USE OF CAISSONS FOR SAMPLING CHEMICAL AND BIOLOGICAL CONDITIONS BENEATH A BEEF FEEDLOT,
Nebraska Univ., Lincoln.
For primary bibliographic entry see Field 5A.
W74-10138

AMMONIA VOLATILIZATION AND NITROGEN TRANSFORMATIONS IN HIGH PH SOILS USED FOR BEEF MANURE DISPOSAL,
Corps of Engineers, Vicksburg, Miss.
For primary bibliographic entry see Field 5B.
W74-10143

A SIMILARITY DURING EARLY STAGES OF RAIN INFLITRATION,
Hawaii Univ., Honolulu. Dept. of Soil Science.
L. R. Ahuja, and M. J. M. Romkens.
Soil Science Society of America Proceedings, Vol 38, No 3, p 541-544, May-June 1974. 4 fig, 10 ref.

Descriptors: *Infiltration, *Rainfall-runoff relationships, *Wetting, Diffusivity, Irrigation, Sprinkler irrigation.

A similarity relationship exists during early stages of rain infiltration into a relatively dry soil in which the diffusivity varies exponentially with the water content. The similarity leads to simple expressions for describing the wet-front progress and the water-content change at the soil surface. The wet-front equation adequately describes the experimental data for four different soils. The approach can be extended to some cases of rainfall when the intensity is time-dependent, and to infiltration with transient surface sealing. (Knapp-USGS)
W74-10205

SOIL WATER CONTENT: MICROWAVE OVEN METHOD,
California Univ., Davis. Dept. of Water Science and Engineering.
R. J. Miller, R. B. Smith, and J. W. Biggar.
Soil Science Society of America Proceedings, Vol 38, No 3, p 535-537, May-June 1974. 2 fig, 3 tab, 6 ref.

Descriptors: *Moisture content, *Soil moisture, *Microwaves, *Drying, Laboratory tests, Gravimetric analysis, Instrumentation.
Identifiers: *Microwave ovens.

The moisture content of soils may be determined rapidly with a microwave technique. Equations are given for estimating soil drying times for two soils of different texture at different moisture contents and for different sample sizes, Drying soil by microwave oven may also be useful as a method for soil preparation prior to chemical analyses. (Knapp-USGS)
W74-10206

ARTIFICIAL WEATHERING OF OXIDIZED BIOTITE: IV. THE INHIBITORY EFFECT OF POTASSIUM ON DISSOLUTION RATE,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nturition.
R. J. Gilkes, and R. C. Young.
Soil Science Society of America Proceedings, Vol 38, No 3, p 529-532, May-June 1974. 3 fig, 1 tab, 10 ref.

Descriptors: *Weathering, *Clay minerals, *Soil chemistry, Mineralogy, X-ray diffraction, Leaching, *Potassium, Chlorides, Iron, Ion exchange.
Identifiers: Dissolution rates, *Biotites.

Rates of dissolution of oxidized biotites in 0.1M 0.01M HCl were severely depressed in the presence of 1M KCl. The amounts of Al, Mg, Mn dissolved in the first extraction were similar to those found without KCl; however, subsequent extractions removed these elements at 10-20% of the corresponding HCl rates. This effect may be due to a decreased rate of vermiculite formation, thereby reducing the effective basal area exposed to attack. A decrease in dissolution rate with increasing ferric iron content was still apparent in the presence of 1M KCl. (See also W73-06730 and W73-06731) (Knapp-USGS)
W74-10209

INFLUENCE OF ANTECEDENT SOIL MOISTURE SUCTION ON SATURATED HYDRAULIC CONDUCTIVITY OF SOILS,
Texas Agricultural Experiment Station, Weslaco.
C. J. Gerard.
Soil Science Society of America Proceedings, Vol 38, No 3, p 506-509, May-June 1974. 6 fig, 4 tab, 5 ref.

Descriptors: *Hydraulic conductivity, *Antecedent moisture content, *Soil water movement, *Moisture tension, Saturated flow, Soil gases, Carbon dioxide, Wetting.

The influence of antecedent soil moisture suction on saturated hydraulic conductivities of soils was studies. Saturated hydraulic conductivity of a soil is a dynamic property which is markedly influenced by antecedent soil moisture suction. Antecedent soil moisture of 0.33 bar suction, such as is often practiced with trickle irrigation, caused marked reduction in the ability of soil to conduct of water. Gases produced by microorganisms at low suction, their subsequent entrapment, and their influence on soil macrovoids are largely responsible for reduction in ability of soil to conduct water. Reduction of effective soil macrovids by microbial growth, flowing water, and soil moisture suction can also reduce soil permeability. Soil moisture management can influence the ability of soil to conduct water. (Knapp-USGS)
W74-10211

SOIL MOTTLING AND DRAINAGE IN A MOLLIC HAPLUDALF AS RELATED TO SUITABILITY FOR SEPTIC TANK CONSTRUCTION,
Wisconsin Univ., Madison. Coll. of Agricultural and Life Sciences.
For primary bibliographic entry see Field 5B.
W74-10212

THE EFFECT OF OVERBURDEN PRESSURE ON CHLORIDE AND WATER MOVEMENT IN SWELLING CLAY SOIL,
Texas Agricultural Experiment Station, College Station.
D. E. Kissel, and J. T. Ritchie.
Soil Science Society of America Proceedings, Vol 38, No 3, p 391-394, May-June 1974. 4 fig, 2 tab, 10 ref.

Descriptors: *Soil water movement, *Clay minerals, *Chlorides, *Expansive soils, *Membrane processes, Adsorption, Leaching, Pressure.

The influence of overburden pressure on the movement of water and Cl was tested in short undisturbed cores of swelling clay soil. When overburden pressure was removed from the cores, saturated flow rates increased. Subsequent miscible displacement studies revealed that the exclusion of Cl was also reduced. When soil cores were loaded with overburden pressure, the amount of soil water from which Cl was excluded was approximately 50%. When overburden pressure was removed, the amount of soil water from which Cl was excluded was 33%, about the same value as measured in disturbed soil cores of approximately the same water content. Differences in the quantity of soil water from which Cl was exluded between loaded and unloaded cores were due to an interaction between soil structure and the negative charge on the clay in the loaded cores. Apparently, when overburden pressure was removed, smaller pores increased in diameter, which allowed Cl to diffuse more freely into these spaces. (Knapp-USGS)
W74-10213

ON THE INTERACTION OF WATER AND HEAT TRANSPORT IN FROZEN AND UNFROZEN SOILS: I. BASIC THEORY; THE VAPOR PHASE,
Geulph Univ. (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 2C.
W74-10215

ON THE INTERACTION OF WATER AND HEAT TRANSPORT IN FROZEN AND UNFROZEN SOILS: II. THE LIQUID PHASE,
Geulph Univ. (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 2C.
W74-10216

TIME-DEPENDENT LINEARIZED INFILTRATION. I. POINT SOURCES,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
A. W. Warrick.
Soil Science Society of America Proceedings, Vol 38, No 3, p 383-386, May-June 1974. 4 fig, 12 ref.

Descriptors: *Soil water movement, *Infiltration, *Unsaturated flow, Equations, Soil moisture, Wetting, Irrigation.
Identifiers: *Trickle irrigation.

Soil water flow from a point source was analyzed using a linearized form of the moisture flow equation. Time-dependence was assumed with the results simplifying to those for steady-state conditions. Discrete time-distributed inputs such as for trickle or high frequency irrigation are amenable to solution. Numerical simulations include the advance of a wetting front during infiltration, moisture variation resulting from a cyclic input as during irrigation, and the matric flux potential field for a two-source problem. (Knapp-USGS)
W74-10217

PREDICTION OF WATER LOSS FROM A FALLOW FIELD SOIL BASED ON SOIL WATER FLOW THEORY,
Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 2D.
W74-10218

METHODS OF CALCULATION OF EVAPORATION AND WATER REGIME IN THE ROOT ZONE OF SOIL ON WATERSHED (METODY RASCHETA ISPARENIYA I VODNOGO REZHIMA KORNEOBITAYEMOGO SLOYA POCHVY NA VODOSBORAKH),
For primary bibliographic entry see Field 2D.
W74-10227

AN ECONOMICAL HYDRAULIC LYSIMETER--CONSTRUCTION AND CALIBRATION,
Jawaharlal Nehru Agricultural Univ., Jabalpur (India). Dept. of Soil Science and Agricultural Chemistry.
R. K. Gupta.
Journal of the Indian Society of Soil Science, Vol 21, No 4, p 377-381, December 1973. 4 fig, 7 ref.

Descriptors: *Lysimeters, *Instrumentation, Equipment, Soil moisture, Soil water, Evapotranspiration, Evaporation, *Calibrations, Measurement, *Moisture meters.

A low cost hydraulically weighed lysimeter designed in India may be constructed from locally available material. The lysimeter consists of a locally fabricated hydraulic load cell as the weighing device, a coconut oil drum as the inner tank and a read out system with a provision to read weight changes in six lysimeters. The lysimeter is sensitive to 100 g (equivalent to 0.04 mm of water). The linear deflection in the water manometer recorded for the lysimeter is 20 mm per kilogram. (Knapp-USGS)
W74-10238

EFFECT OF ACIDITY ON REACTIONS OF ORGANIC ACIDS AND AMINES WITH MONTMORILLONITIC CLAY SURFACES,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 5B.
W74-10244

FORMATION OF CLAY-PROTEIN COMPLEXES,
New Hampshire Univ., Durham.
R. D. Harter, and G. Stotzky.
Soil Science Society of America Proceedings, Vol 35, No 3, p 383-389, May-June 1971. 3 fig, 4 tab, 26 ref. OWRR A-020-NH(8), PHS Grant A1-08476-01.

Descriptors: *Adsorption, *Clay minerals, *Proteins, *Trace elements, Soil chemistry, Sodium, Nutrients, Organic matter, Organic compounds, Hydrogen ion concentration.
Identifiers: *Clay-organic complexes.

Proteins (catalase, alpha-casein, alpha-chymotrypsin, edestin, beta-lactoglobulin, lysozyme, ovalbumin, ovomucoid, and pepsin), ranging in molecular weight from approximately 17,000 to 310,000 and in isoelectric point from approximately pH 2 to 11, were adsorbed onto smectite homoionic to H, Na, Ca, Al, La, or Th. Adsorption was observed in every combination of homoionic clay and protein, even when the ambient pH of the clay suspensions (which ranged from approximately pH 3 to 7) was several units above the isoelectric point of the protein. The amount of protein adsorbed and the shapes of both the adsorption isotherms and the binding isotherms were more related to the molecular weight of the proteins and to the valency of the cations on the clay exchange complex than to the ambient pH of the clay-protein systems and the isoelectric point of the proteins. In general, the amount of adsorption was directly proportional to molecular weight of the proteins and inversely proportional to cationic valence. (Knapp-USGS)
W74-10245

ADSORPTION OF LYSOZYME AND OVALBUMIN BY CLAY: EFFECT OF CLAY SUSPENSION PH AND CLAY MINERAL TYPE,
New Hampshire Univ., Durham. Inst. of Natural and Environmental Resources.
J. T. Albert, and R. D. Harter.
Soil Science, Vol 115, No 2, p 130-136, 1973. 4 fig, 1 tab, 11 ref.

Descriptors: *Adsorption, *Clay minerals, *Proteins, Hydrogen ion concentration, Soil chemistry, Nutrients, Organic matter, Organic compounds.
Identifiers: *Clay-organic complexes, *Lysozyme, *Ovalbiumin.

Adsorption of lysozyme and ovalbumin to all clay minerals except kaolinite in influenced by clay suspension pH. In laboratory studies, the adsorption of both proteins increased as the clay suspension pH approached the protein isoelectric point. In unbuffered systems, adsorption of protein was observed at suspension pH values considerably above the protein isoelectric point. With the exception of kaolinite, adsorption of protein to sodium clays caused an observed increase in sodium ion in solution, thus indicating a cation exchante adsorption mechanism. Lysozyme apparently intercalated smectite, but in all other cases protein appeared to be adsorbed only on external sites, especially near the clay edges. (Knapp-USGS)
W74-10246

PROBLEM OF MEASUREMENT OF SOIL MOISTURE POTENTIAL BY THE CRYOSCOPIC METHOD (K VOPROSU OB IZMERENII POTENTSIALA POCHVENNOY VLAGI KRIOSKOPICHESKIM METODOM),
Moscow State Univ. (USSR).
A. D. Voronin, and V. D. Skalaban.
Meteorologiya i Gidrologiya, No 9, p 56-65, September 1973. 3 fig, 1 tab, 11 ref.

Descriptors: *Soil physics, *Soil water, *Soil moisture, *Measurement, *Thermodynamics, Entropy, Free energy, Equilibrium, Temperature, Isotherms, Freezing, Cooling, Water types, Water vapor, Vapor pressure, Isobars, Instrumentation, Hygrometry, Curves, Equations.
Identifiers: USSR, Moisture potential, *Cryoscopic method.

Theoretical and procedural problems of the cryoscopic method of measurement of soil moisture potential are discussed. The method is applicable at comparatively high moisture values, when entropy differences of soil water and free water, which cause a dependence of the potential on temperature, are very small. The method can be used with sufficient accuracy for estimation of the potential at positive temperatures. Procedural errors of many handbooks are critically reviewed. (Josefson-USGS)
W74-10265

SUBSURFACE IRRIGATION IN HAWAIIAN SUGARCANE,
Hawaiian Sugar Planters' Association Experiment Station, Honolulu.
For primary bibliographic entry see Field 3F.
W74-10326

CULTURAL PRACTICES FOR IRRIGATED WINTER WHEAT PRODUCTION,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 3F.
W74-10327

SALT TOLERANCE OF MEXICAN WHEAT: I. EFFECT OF NO3 AND NACL ON MINERAL NUTRITION, GROWTH, AND GRAIN PRODUCTION OF FOUR WHEATS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
For primary bibliographic entry see Field 3C.
W74-10328

MEASUREMENT OF THE DIFFUSION COEFFICIENT OF BORON IN SOIL USING A SINGLE CELL TECHNIQUE,
College of Agriculture, Sungei Besi (Malaysia).
For primary bibliographic entry see Field 5B.
W74-10329

NITRATE-N ACCUMULATION IN THE SOIL PROFILE UNDER ALFALFA,
Illinos Univ., Dept. of Agronomy. Urbana.
For primary bibliographic entry see Field 5B.
W74-10330

PRINCIPLES OF MANAGING HIGH FREQUENCY IRRIGATION,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3F.
W74-10331

SOIL MULCH EFFECTS ON SEEDBED TEMPERATURE AND WATER DURING FALLOW IN EASTERN WASHINGTON,
Agricultural Research Service, Pullman, Wash. Soil and Water Conservation Research Div.
For primary bibliographic entry see Field 3F.
W74-10333

PRESERVATION OF SOIL SAMPLES FOR INORGANIC NITROGEN ANALYSES,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
D. W. Nelson, and J. M. Bremner.
Agronomy Journal, Vol 64, No 2, p 196-199, March-April, 1972. 3 tab, 23 ref.

Descriptors: *Nitrates, *Inorganic compounds, *Nitrogen, Nitrogen cycle, Nitrogen fixation, Nitrogen compounds, Soil analysis, *Iowa.

Studies of the effects of several pretreatments and storage conditions on the inorganic N contents of 10 Iowa soils indicated that storage at -5 C in an airtight container is a satisfactory method of preserving field-moist soil samples for inorganic N analyses. Storage at this temperature did not cause a significant change in the exchangeable ammonium N, nitrate N, or fixed ammonium N contents of the soils studied. Air-drying at 22 C increased the inorganic N contents of most of the soils studied, with the average increase 4.2 ppm for exchangeable ammonium N, 1.7 ppm for nitrate N, and 4.4 ppm for fixed ammonium N. Oven-drying at 55 C resulted in a slightly larger increase in exchangeable ammonium N than did air-drying at 22 C, and drying at 22 C in ammonia-free air caused a smaller increase in exchangeable ammonium N than drying at the same temperature in laboratory air. Storage of air-dried soils in paper bags for 9 months led to marked increases in their inorganic N contents. (Skogerboe-Colorado State)
W74-10334

COMPARATIVE YIELD AND FERTILIZER EFFICIENCY OF NO-TILLAGE AND CONVENTIONALLY TILLED CORN,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
For primary bibliographic entry see Field 3F.
W74-10335

INFLUENCE OF SALINITY ON FE, MN, AND ZN UPTAKE BY PLANTS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3C.
W74-10336

RESPONSE OF CORN TO TIME AND RATE OF PHOSPHORUS AND ZINC APPLICATION,
West Virginia Univ., Morgantown. Div. of Plant Sciences.
For primary bibliographic entry see Field 3F.
W74-10337

RESPONSE OF IRRIGATED CORN TO TIME, RATE, AND SOURCE OF APPLIED N ON SANDY SOILS,
Wisconsin Univ., Madison. Dept. of Agronomy.
For primary bibliographic entry see Field 3F.
W74-10338

SENSITIVITY OF SOUTHERN PEAS TO PLANT WATER DEFICIT AT THREE GROWTH STAGES,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W74-10340

BULK DENSITY OF A FRAGIPAN SOIL IN NATURAL AND DISTURBED PROFILES,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 8D.
W74-10342

NITROGEN, SALINITY, AND ACIDITY DISTRIBUTION IN AN IRRIGATED ORCHARD SOIL AS AFFECTED BY PLACEMENT OF NITROGEN FERTILIZERS,
Philippines Univ., Laguna. Coll. of Agriculture.
For primary bibliographic entry see Field 3C.
W74-10343

EFFECT OF ION-PAIR FORMATION ON THE SOLUBILITY PRODUCT,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
K. L. Babcock, and G. M. Marion.
Soil Science Society of America Proceedings, Vol 36, No 4, p 689-691, July-August, 1972. 4 ref.

Descriptors: *Ions, Ion exchange, *Solubility, *Gypsum, Soil chemistry, *Electrolytes.

Two treatments of electrolyte solutions in which ion-pair formation occurs are possible: one as a strong electrolyte, the other as a weak electrolyte. It is demonstrated, however, that the value of a solubility product is independent of the method of treatment. (Skogerboe-Colorado State)
W74-10345

QUALITY OF DRAINAGE WATER FROM A HEAVY-TEXTURED SOIL,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W74-10346

2H. Lakes

DISTRIBUTION OF TRACE METALS IN A WARM WATER RELEASE IMPOUNDMENT,
Quachita Baptist Univ., Arkadelphia, Ark.
J. Nix.
Available from the National Technical Information Service as PB-233 788 $8.25 in paper copy, $1.45 in microfiche. Completion Report, Arkansas Water Resources Research Center, Fayetteville, April 1974. 377 p, 91 fig, 43 tab, 20 ref. OWRR B-014-ARK(2), 14-01-0001-3057.

Descriptors: *Arkansas, *Impoundments, *Trace elements, *Heavy metals, *Water quality, Water temperature, Dissolved oxygen, Turbidity, Iron, Manganese, Sodium, Potassium, Calcium, Magnesium, Nitrates, Zinc, Phosphates, Sulfates, Chlorides, Fluorides, Cadmium, Alkalinity, Copper cobalt, Nickel, Lead, Chemical oxygen demand, Hydrogen ion concentration, Path of pollutants, Distribution patterns.
Identifiers: *DeGray Reservoir(Ark), Silver.

A water quality study of the DeGray Reservoir, Arkansas, was conducted following the beginning of impoundment through the first year the reservoir was operated near normal poll elevation. This reservoir is the first major dam in Arkansas with upper level release capabilities. Temperature, dissolved oxygen, and turbidity were measured in situ over the old river channel. Samples from each station were analyzed for: pH, sodium, potassium, calcium, magnesium, nitrate, phosphate, sulfate, chloride, fluoride, alkalinity, COD, iron, manganese, copper, cobalt, nickel, lead, zinc, cadmium, and silver. Heavy metals were determined in both the particulate fraction (retained by a 0.45 micron filter) and the soluble fraction (passed by a 0.45 micron filter). Density currents, laden with silt were observed near the top of the thermocline and apparently are the origin of metalimnic dissolved oxygen minimum. The total quantity of both iron and manganese was found to cycle in response to oxygen depletion in the hypolimnion; it was difficult to determine if seasonal fluctuation of these metals was occuring. Temperature regimen in the river is similar to that present befor impoundment.
W74-09801

THE MIXING PATTERNS OF THE JORDAN RIVER IN LAKE KINNERET,
Kinneret Limnology Lab., Tiberias (Israel).
S. Serruya.
Limnology and Oceanography, Vol 19, No 2, p 175-181, March 1974. 8 fig, 2 tab, 6 ref.

Descriptors: *Mixing, *Lakes, *Density stratification, *Path of pollutants, Saline waters, Nutrients, Salinity, Turbidity, Seasonal, Water quality.
Identifiers: *Israel(Lake Kinneret).

The major flow of the Jordan River into Lake Kinneret is during winter. At the beginning of the floods, the river water flows southward directly on the bottom of the lake. In late winter or spring, the river water is deflected toward the western shore and mixes rapidly in the upper layers of the lake. These patterns are explained on the basis of density changes due to variations of temperature, salinity, and suspended material. (Knapp-USGS)
W74-09890

DETERMINATION OF LABILE AND STRONGLY BOUND METALS IN LAKE WATER,
Canada Centre for Inland Waters, Burlington, (Ontario).
For primary bibliographic entry see Field 5A.
W74-09896

LAKE MICHIGAN,
For primary bibliographic entry see Field 5C.
W74-09953

LAKE ERIE,
For primary bibliographic entry see Field 5C.
W74-09954

FLOODING PROBLEMS ASSOCIATED WITH CURRENT HIGH LEVELS OF THE GREAT LAKES.
Michigan Dept. of Natural Resources, Lansing. Water Development Services Div.
December, 1973. 47 p, 19 tab, 22 photo, 5 map, 3 fig.

Descriptors: *Flood control, *Flood damage, *Flood protection, *Michigan, *Great Lakes, Lakes, Flood plain insurance, Flood plains, Flood forecasting, Non-structural alternatives, Insurance, Shore protection, Planning, Investigations, Water resources development, Flood plain zoning, Water levels.
Identifiers: National Flood Insurance Act.

A summary is presented of an investigation of the flood problems associated with the current high levels of the Great Lakes. A compilation of damage estimates and possible alternative courses of future action in this area are included. In addition to examining the reasons for the high water

level, the effects on navigation, physical property damage and fish and wildlife populations are discussed. This is followed by an examination of what can be done under existing state and federal programs. The possibility of relief by construction of a series of controls is dismissed as too costly, exceeding the value of what is to be protected. The 1968 National Flood Insurance Act is discussed as well as the Flood Disaster Protection Act of 1973. Alternatives are suggested for future action such as amending the Shorelands Protection Act to require identification of flood hazard areas so that community and state agencies are able to regulate future land use. (Gragg-Florida)
W74-09994

NOVEMBER 1972 FLOODS ON THE LOWER GREAT LAKES,
Windsor Univ., (Ontario). Dept. of Geography.
A. J. Brazel, and D. W. Phillips.
Weatherwise, Vol 27, No 2, p 56-62, April, 1974. 6 fig, 2 tab, 7 ref.

Descriptors: *Flooding, *Flood damage, *Flood forecasting, *Great Lakes Region, Flood waves, Sewer systems, Costs, Investigation, Forecasting, Agriculture, Geomorphology, Meteorology, *Canada, *Lake Erie.
Identifiers: *Lake St. Clair, Toronto(Canada).

Public and political outcry was noted in 1972 due to high water levels on the Great Lakes. Extensive flood damage had occurred for which individuals, industries, and governments were blamed. This study gives a meteorological analysis of the flooding, wave action, wind set-up and seiche, both over time and for various portions of specific lakes. Shoreline damage and structural weakening of shorefront structures, geomorphological damage, harmful effects to wildlife, agriculture, and sewer systems cannot be measured in costs, although measurable damage amounted to over twenty-five million dollars. The result of this investigation was the establishment of a Lake Level Advisory and Warning Service in Toronto in 1973. This forecasts wave heights and potential inundation levels along the Lake Erie and Lake St. Clair shorelines. (Prague-FIRL)
W74-10050

MATHEMATICAL MODEL OF THE BIOTIC CIRCULATION WITHIN THE LAKE ECOSYSTEM, (IN RUSSIAN),
Akademiya Nauk SSR, Leningrad. Institut Evolyutsionnoi Fiziologii i Biokhimii.
For primary bibliographic entry see Field 5C.
W74-10126

TEMPERATURE REGIME OF DEEP WATER BODIES DURING SPRING AND SUMMER HEATING (TEMPERATURNYY REZHIM GLUBOKIKH VODOYEMOV V PERIOD VESENNE-LETNEGO NAGREVA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
M. P. Vadkovskaya.
Vodnyye Resursy, No 2, p 88-96, 1974. 20 ref.

Descriptors: *Bodies of water, *Deep water, *Temperature, *Heating, *Seasonal, Spring, Summer, Heat transfer, Thermal conductivity, Convection, Thermal stratification, Thermocline, Lakes, Reservoirs, Equations.
Identifiers: *USSR.

Basic data in the Soviet and foreign literature on heat transfer in deep reservoirs and lakes during spring and summer heating are reviewed. Possible mechanisms of heat transfer at different stages of heating, and ways of approaching their theoretical interpretation are examined. Attention is directed to factors affecting the degree and intensity of heating of water bodies and their water temperature at different stages of heating. (Josefson-USGS)
W74-10226

RELATION OF FLUCTUATIONS IN LEVELS OF THE CASPIAN AND ARAL SEAS (O SVYAZI KOLEBANIY UROVNEY KASPIYSKOGO I ARAL'SKOGO MOREY),
Moscow State Univ. (USSR).
S. A. Mayeva, A. N. Kosarev, and Ye. G. Mayev.
Vodnyye Resursy, No 2, p 41-48, 1974. 2 fig, 18 ref.

Descriptors: *Lakes, *Water levels, *Water level fluctuations, Variability, Moisture, Streamflow, Runoff, Climates.
Identifiers: *USSR, *Caspian Sea, *Aral Sea.

The Caspian and Aral Seas are related by territorial proximity and isolation from the world ocean. Climatic variations are the main, if not sole, factor governing the surface levels of the seas. During long-term periods irregular fluctuations in levels of the seas were due to significant differences in the natural conditions of watersheds, varying regimes of streamflow, and to size of the actual seas and their basins. During short-term periods variable changes in periods of increased and reduced moisture in the sea basins are also a factor. (Josefson-USGS)
W74-10229

SYSTEMS OF A WIND-WAVE FIELD (SISTEMY POLYA VETROVYKH VOLN),
Gosudarstvennyi Proektno-Izyskatelskii i Nauchno-Issledovatelskii Institut Morskogo Transporta 'Soyuzmorniiproekt', Moscow (USSR).
For primary bibliographic entry see Field 2E.
W74-10258

POSSIBILITY OF MAPPING ICE CONDITIONS ON LARGE LAKES FROM SATELLITE IMAGERY (VOZMOZHNOST' KARTIROVANIYA LEDOVOY OBSTANOVKI NA KRUPNYKH OZERAKH PO SNIMKAM S ISKUSSTVENNYKH SPUTNIKOV ZEMLI),
Gosudarstvennyi Gidrologicheski Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2C.
W74-10266

EUTROPHICATION AND RECOVERY IN EXPERIMENTAL LAKES: IMPLICATIONS FOR LAKE MANAGEMENT,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 5C.
W74-10294

2I. Water In Plants

LITTER AND SOIL MICROBIAL DYNAMICS IN A DECIDUOUS FOREST STAND,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-09823

A BIBLIOGRAPHY OF THE ZOOLOGY OF TENNESSEE AND THE TENNESSEE VALLEY REGION,
Office of Information Services (AEC), Oak Ridge, Tenn.
C. S. Shoup.
Avail: NTIS, Springfield, Va., as Rept. No. NP-19905; $7.60/copy, $1.45/microfiche. Report No. NP-19905, 1974. 255 p, 3352 ref, 2 append.

Descriptors: *Bibliographies, Tennessee, River basins, Rivers, *Tennessee River, Documentation, Publications, Wildlife, Systematics, Ecology, Ecosystems, Animal groupings, *Wildlife.
Identifiers: *Zoology, *Tennessee Valley Region, *Clinch River(Tenn).

This bibliography is a listing of published papers from the periodical literature, with some reports and dissertations that have been found, all dealing with the fauna of the State of Tennessee and nearby areas in the valleys of the Tennessee and Cumberland rivers. The main body of the list comprises taxonomic and ecological publications that contain species lists or notices of collections in these areas, including, in some instances, publications that concern other terrestrial or aquatic forms found in nearby regions of North Carolina, Georgia, Alabama, Kentucky, or Virginia. These species must certainly overlap into Tennessee. (Houser-ORNL)
W74-09826

ON A NEW TREMATODE (EUCREADIUM GANGI H. SP.) FROM A FRESH-WATER FISH TRICHOGASTER FASCIATUS BLOCH AND SCHNEIDER,
Lucknow Univ. (India). Dept. of Zoology.
K. C. Pandey.
Indian J Zootomy. Vol 11, No 3, p 149-150, 1970(1972). Illus.
Identifiers: *Eucreadium-Gangi, *Fish infections, *India(Lucknow), New species, *Trematodes, *Trichogaster-Fasciatus.

A large number of specimens of T. fasciatus a common fresh-water fish, were examined at Lucknow, India. Three specimens were found infected with a single fluke of the genus Eucreadium Dayal, 1942, described as a new species, E. gangi.--Copyright 1973, Biological Abstracts, Inc.
W74-10040

MEMBRANE FILTER TECHNIQUE FOR ENUMERATION OF PSEUDOMONAS AERUGINOSA,
Environmental Protection Agency, Narragansett, R. I. Northeastern Water Supply Lab.
For primary bibliographic entry see Field 7B.
W74-10042

TEXTBOOK OF FISH CULTURE. BREEDING AND CULTIVATION OF FISH,
M. Huet, and J. A. Timmermans.
Fishing News (Books) Ltd.: London, England. 1972. Revised Ed. 436 p, Illus. Pr. 12.50.
Identifiers: *Breeding, Catfish, *Cultivation, Cyprinid, *Fish culture, Perciformes, Ponds, Salmonid, Stocking, *Publications, *Fish productivity.

This book, translated from the 4th edition of the French 'Traite de Pisciculture,' was entirely revised and considerably enlarged. Instead of being devoted mainly to fish breeding in temperate climates, it also discusses the principal types of fish culture practiced in both fresh and brackish water all over the world. It includes the rearing of more than 100 spp. of fish. A section on ponds and fish suitable for cultivation, includes construction and layout of ponds, and natural food and growth of cultivated fish. Breeding and cultivation of salmonids, of cyprinids, of perciformes and of catfish, as well as special types of fish cultivation for restocking, special types of fish breeding and cultivation and regional fresh water fish culture are discussed. The section on control and increase of production in fish cultivation covers the following specific topics: natural productivity of ponds, biological means of increasing production, maintenance and improvement of ponds, artificial feeding of fish; total productivity and stocking of ponds and enemies and diseases of fish. The section on harvesting of fish discusses fishing out the pond, sorting and grading the fish, storing the fish, transport of fish and conservation of fish. A list of principal cultivated fish, include scientific and common names in French and English. A general bibliography and a special bibliography for each chapter are included.--Copyright 1973, Biological Abstracts, Inc.
W74-10045

FAUNISTIC ECOLOGICAL STUDIES ON AQUATIC INSECT LARVAE (TRICHOPTERA, PLECOTPERA AND EPHEMEROPTERA) IN THE WIEHL, A HIGHLAND MEADOW STREAM IN THE OBERBERGISCHES LAND,
D. Jaeger.
Decheniana, Vol 125 No 1/2, p 23-41, 1972. Illus. (English summary).
Identifiers: Aquatic insects, Ecological studies, Ephemeroptera, *Germany(Wiehl), Highland, Larvae, *Mayflies, *Caddinflies, *Stoneflies.

Faunistic and ecological studies of the middle of the Wiehl (West Germany) a stony running water in the area of the future Wiehl barrage in the 'Oberbergisches Land' were done from Jan. to Dec. 1970. Larvae of caddis flies (Trichoptera), stone flies (Plecoptera) and may flies (Ephemeroptera) were collected and determined. Hydrophysical and hydrochemical conditions were investigated. The numbers of species found are 18 caddis flies, 11 stone flies and 13 May flies. The comparable fauna of the Rhine river in the west is entirely different. There is a continuous transition to the Sauerland in the east of the Wiehl area.--Copyright 1973, Biological Astracts, Inc.
W74-10047

REFLECTANCE OF VEGETATION, SOIL, AND WATER,
Agricultural Research Service, Weslaco, Tex.
For primary bibliographic entry see Field 7B.
W74-10252

COOK INLET SOCKEYE SALMON INVESTIGATIONS,
Alaska Dept. of Fish and Game, Juneau.
For primary bibliographic entry see Field 8I.
W74-10267

PARASITES OF YOUNG GRASS CARP CTENOPHARYNGODON IDELLA (VALENCIENNES) AT FISH FARMS OF THE VOLGA DELTA, (IN RUSSIAN),
G. A. Stepanova.
Tr Kasp Nauchno-Issled Inst Rybn Khoz. 26. p 250-254. 1971.
Identifiers: Apiosoma sp., *Carp, Cestodes, Colylurus-Pileatus, Crustaceans, Ctenopharyngodon-Idella, Deltas, Diplostomum sp., Diptozoon-Paradoxum, Epistylis-Sp, *Fish, Parasites, Gyrodactylus-Katheriner, Nematodes, Protozoa, Sphaerospora-Carassii, Trematodes, Trichodina sp., *USSR(Volga delta).

Complete parasitological autopsy was used to investigate 115 specimens of grass carp less than 1 yr old, 42 1 yr old, 48 2 yr old and 29 adult specimens from ponds of fish farms in the Astrakhan region, USSR. The study revealed 26 spp. of parasites: 12 protozoans, 4 manogenetic flukes, 2 cestodes, 6 trematodes, 1 nematode, and 1 parasitic crustacean. The species composition of parasites increases with age. The seasonal dynamics of infection of 1- and 2-yr-old grass carp by the parasites was traced. The parasitic fauna of the grass carp, which was introduced in the fishery of the Volga delta, is represented by local and imported species, of which the local species of parasites predominate. The following species of parasites were found for the first time in grass carp at fish farms of the Volga delta: Sphaerospora carassii, Trichodina nigra, Apiosoma piscicola, A. magna, A. minimicro nucleata, Epistylis sp., Gyrodactylus kathariner, Diptozoon paradoxum, Colylurus pileatus, Diplostomum macroctomum, Diplostomum mergi, Trichodina reticulata, and Trichodina pediculus.--Copyright1973, Biological Abstracts, Inc.
W74-10313

THE EFFECT OF PARENT ROCK ON SOIL FORMATION IN THE TAIGA-FOREST ON THE RIGHT BANK OF THE OB RIVER, (IN RUSSIAN),
Moscow State Univ. (USSR).
E. D. Nikitin.
Biol Nauki. Vol 14, No 12, p 100-104. 1971.
Identifiers: Cold climates, Forests, *Parent rock, Rivers, *Soil formation, Taiga, *USSR(Ket-Tymsk interfluve area), Waterlogging.

The soil cover of the Ket-Tymsk interfluve area was studied. Cold climate and waterlogging weakens the soil buildup process. Under such conditions the intensity of podzolic soil formation depends on the composition of the cover and its filtering properties. The soil composition of the various layers is presented.--Copyright 1973, Biological Abstracts, Inc.
W74-10324

RECORDING WATER USE BY MEANS OF DIGITAL EQUIPMENT,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 7B.
W74-10332

2J. Erosion and Sedimentation

WATER MOTION AND WATER-SEDIMENT INTERACTION,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5B.
W74-09863

LONGSHORE SAND TRANSPORT INTTHE SURF ZONE ALONG THE MEDITERRANEAN EGYPTIAN COAST,
Alexandria Univ., (Egypt). Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W74-09891

EFFECTS OF HIGH-MAGNITUDE FLOODS ON CHANNEL FORM: A CASE STUDY IN MARYLAND PIEDMONT,
Southern Illinois Univ., Carbondale. Dept. of Geography.
A. Gupta, and H. Fox.
Water Resources Research, Vol 10, No 3, p 499-509, June 1974. 9 fig, 3 tab, 6 ref.

Descriptors: *Floods, *Channel erosion, *Channel morphology, Sediment transport, Scour, Erosion, Stream erosion, *Maryland, Historic floods, Flood plains, Alluvial channels, Sedimentary structures, Geomorphology.
Identifiers: *Patuxent River(Md).

Major changes in channel morphology were caused by four major floods in the Patuxent River basin in the Maryland piedmont during the summers of 1971-1972. High flows of August 3-4 and September 11-12, 1971, caused by thunderstorms were of 50-year and over 100-year recurrence intervals, respectively. On August 27, 1971, a nearby storm brought bank-full flooding and tropical storm Agnes again produced floods well over the 100-year level on June 21-22, 1972. Record discharges on the Patuxent and its tributary, the Little Patuxent, were recorded on September 11, 1971, and June 22, 1972, respectively. Among the more striking effects were destruction of floodplain vegetation, widening of stream channels, and clearing of the channels of all but very coarse materials. Low and medium flows succeeding each flood reduced enlarge channel widths by building up bar remnants with fines and forming new bars along channel margins, tending to destroy the evidence of such floods. Channels preserve flood-originated forms when high-magnitude floods occur with sufficient regularity. (Knapp-USGS)
W74-09904

CONCEPTS OF MATHEMATICAL MODELING OF SEDIMENT YIELD,
Geological Survey, Bay Saint Louis, Miss.
J. P. Bennett.
Water Resources Research, Vol 10, No 3, p 485-492, June 1974. 1 fig, 34 ref.

Descriptors: *Sediment yield, *Mathematical models, Reviews, Equations, *Erosion, Soil erosion, Sediment transport, Slopes.

A deterministic structure imitating a sediment yield model should mathematically approximate the behavior of two distinct phases of the phenomenon, the upland phase and the lowland channel phase. For upland erosion, research is most needed in quantifying gully erosion, whereas for lowland streams it is most needed to explain the influence of meanders on bed material transport and to develop a floodplain accounting component. In both phases, research is needed to explain the effects of unsteadiness and flow nonuniformities on transport. Sensititivity analysis studies of sediment yield models are needed to illustrate how well the models can be calibrated and what output precision can be expected from input data with known statistical characteristics. Present estimates indicate that although a regression of annual sediment discharge on annual water discharge might be expected to give a prediction within 20% of the observed value, even a well-calibrated digital model might give an error greater than 40% for a single storm on a small watershed. (Knapp-USGS)
W74-09905

STATISTICAL TESTS OF LEOPOLD'S SYSTEM FOR QUANTIFYING AESTHETIC FACTORS AMONG RIVERS,
Calgary Univ. (Alberta). Dept. of Geography.
For primary bibliographic entry see Field 6G.
W74-09913

THE SOIL CREEP--CURVED TREE FALLACY,
Geological Survey, Reston, Va.
R. L. Phipps.
Journal of Research of the U S Geological Survey, Vol 2, No 3, p 371-377, May-June 1974. 11 fig, 13 ref.

Descriptors: *Creep, *Dendrochronology, *Trees, Mass wasting, Degradation(Slope), Growth rates, Forests, Plant growth.

No evidence was found in eastern deciduous forests to substantiate statements that curved tree trunks, downslope tilted tree trunks, and upslope trailing tree root systems are the result of soil creep. Curvature and tilting of trunks are geotropic and phototropic responses to physical and physiological conditions unrelated to soil creep. The occurrence of upslope trailing of roots has not been demonstrated. The classical trunk shape, oblique at the base above which the trunk is straight, cannot result from soil creep which continuously tips the trunk downslope. Such a shape can result from any mechanical force or phototropism which exerts a much greater force when the tree is small than when it grows larger. Trees on slopes have a tendency to lean downslope as a phototropic response, which is a function of slope steepness and degree of shade tolerance of the individual tree species. (Knapp-USGS)
W74-09918

AVERAGE RATIOS OF URANIUM AND ORGANIC MATTER IN RECENT MARINE AND OCEAN SEDIMENTS (O SOOTNOSHENII SREDNIKH KONTSENTRATSIY URANA I ORGANICHESKOGO VESHCHESTVA V SOVREMENNYKH MORSKIKH I OKEANSKIKH OSADKAKH),
G. N. Baturin.
Akademiya Nauk SSSR Doklady, Vol 207, No 1, p 186-189, 1972. 1 tab, 21 ref.

Descriptors: *Geochemistry, *Organic matter, *Deposition(Sediments), Recent epoch, *Oceans, Sediments, Sands, Silts, Sedimentary basins(Geologic).
Identifiers: *USSR, *Uranium, *Organic carbon.

Uranium/organic carbon ratios were compared in different types of sediments containing varying amounts of uranium. Calculations of uranium/organic carbon ratios were made for sediments in the Aral, Caspian, Black, Azov, Baltic, and Kara Seas and in the Pacific, Indian, and Atlantic Oceans. In individual samples of marine and ocean sediments the uranium content varies between 0.00001 and 0.006, the organic carbon content between 0.1 and 15%, and the uranium/organic carbon ratio between 0.00003 and 0.003. Average values in each of the basins studied are more uniform and uranium/organic carbon ratios vary between 0.0001 and 0.0007. In most seas, smallest uranium/organic carbon ratios are found in sandy-silty sediments deposited at a relatively high rate. Largest uranium/organic carbon ratios are characteristic of slowly deposited sediments of halistatic zones, enriched in both organic matter and uranium. Average uranium/organic carbon ratios are largest in the Aral and Caspian Seas (0.0008 and 0.00045, respectively) and smallest in the Baltic (0.0003). In oceans where water contains 0.000003 g of uranium per liter, average uranium/organic carbon ratios in sediments vary between 0.0002 and 0.0007. Largest average ratios (0.0007) are characteristic of red clay in the Pacific. In most main types of marine and ocean sediments, average uranium/organic carbon ratios vary between 0.0002 and 0.0004. Major deviations from this ratio are due either to predominance of terrigenous uranium in sediments or to presence of phosphates. (Josefson-USGS)
W74-09935

THREE-DIMENSIONAL FLOW AND SEDIMENT TRANSPORT AT RIVER MOUTHS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 2L.
W74-09946

A PROPOSED OPEN BEACHES STATUTE FOR FLORIDA,
Miami Univ., Fla. Ocean Law Program.
P. A. Dales, III.
Report No 5, October 1973. 17 p.

Descriptors: *Florida, *State legislation, *Beaches, *Shore protection, *Coasts, Beach erosion, Berms, Dunes, Littoral drifts, Recreation, Recreation facilities, Shores, Sands, Tidal effects, Waves, Water law, Enforcement, Public rights, Easements, Access routes, Land use, Low water mark, Ownership of beds.

The proposal for a Florida Open Beaches statute is a result of the increasing belief that active beaches are subject to a public easement which has been used and should continue to be used by the public as a common. The proposal contemplates regulation through the police power of what use a private littoral landowner can make of his land. The proposed act includes a declaration of public rights and easements in the land between the extreme low tide and the line of vegetation. The Division of Recreation and Parks of the Department of Natural Resources is responsible for the regulation of recreational activities on beaches, and the Marine Resources Division of that department is charged with the protection of vital sand dunes. Permits for physical activity will issue after due regard is given for protection of public accesses to the beaches. Surveys of the coastal shores to establish beach limits, dune lines, and vegetation lines are provided. Penalties for violation of the statute are also included. (Proctor-Florida)
W74-09977

CONCENTRATION AND DISTRIBUTION OF TRACE ELEMENTS IN THE MAUMEE RIVER BASIN, OHIO, INDIANA AND MICHIGAN,
Ohio State Univ., Columbus. Dept. of Geology and Mineralogy.
For primary bibliographic entry see Field 5B.
W74-10084

SEPARATION OF CLAY MINERALS AND SOIL CLAYS USING ISOPYCNIC ZONAL CENTRIFUGATION,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-10125

SPLASH CORRECTION FACTORS FOR SOIL EROSION STUDIES,
Agricultural Research Service, Saint Paul, Minn.
D. A. Farrell, W. C. Moldenhauer, and W. E. Larson.
Soil Science Society of America Proceedings, Vol 38, No 3, p 510-514, May-June 1974. 4 fig, 10 ref, append.

Descriptors: *Impact(Rainfall), *Laboratory tests, *Soil erosion, Model studies, Soil surfaces, Erosion.
Identifiers: *Splash erosion.

Tests of soil detachment by raindrop impact are substantially affected by the size and shape of the container. The area factor for splash pans of circular or rectangular geometry can be readily found. (Knapp-USGS)
W74-10210

FISSION PARTICLE TRACKS IN MICAS AND MICACEOUS VERMICULITES AS RELATED TO CHEMICAL WEATHERING AND CATION EXCHANGE PROPERTIES,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5A.
W74-10214

VARIATION OF REGIME COEFFICIENTS IN PAKISTAN CANALS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-10219

THE EFFECT OF TOPOGRAPHY AND WATER EROSION ON RUNOFF (VLIYANIYE REL'YEFA I VODNOY EROZII NA STOK),
Odessa State Univ. (USSR).
G. I. Shvebs.
Vodnyye Resursy, No 2, p 62-77, 1974. 3 fig, 4 tab, 23 ref.

Descriptors: *Runoff, *Topography, *Erosion, Slopes, Overland flow, Precipitation(Atmospheric), Precipitation intensity, Runoff coefficient, Snow cover, Infiltration, Soil moisture, Soil properties, Sprinkling, Flumes, Equations.
Identifiers: USSR.

The qualitative effect of topography and erosion processes on runoff through redistribution of precipitation and changes in soil moisture infiltration and expenditure conditions is demonstrated. Relations which consider this phenomenon are presented, and conditions under which variability of runoff under the effect of topography most likely occurs are noted. (Josefson-USGS)
W74-10228

EVALUATION OF TEXTURAL PARAMETERS AS BEACH-DUNE ENVIRONMENTAL DISCRIMINATORS ALONG THE OUTER BANKS BARRIER, NORTH CAROLINA,
Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
For primary bibliographic entry see Field 2L.
W74-10247

IRON IN ATLANTIC SEDIMENTS (ZHELEZO V OSADKAKH ATLANTICHESKOGO OKEANA),
Akusticheskii Institut, Moscow (USSR).
Ye. M. Yemel'yanov, and I. I. Shurko.
Akademiya Nauk SSSR Doklady, Vol 209, No 3, p 699-702, 1973. 1 fig, 1 tab, 12 ref.

Descriptors: *Oceanography, *Atlantic Ocean, *Iron, *Sediments, Bottom sediments, Sediment distribution, Particle size, Pacific Ocean, Mapping.
Identifiers: *USSR, Ooze.

A total of 593 iron samples were collected and studied in the upper layer of bottom sediments in the Atlantic Ocean. Distribution of iron is fairly nonuniform across the ocean floor. This nonuniformity is due to irregular concentration of iron in different compositional-genetic types and particle-size fractions of sediments and to their spatial distribution characteristics. Highest iron concentrations were established in hydrogoethite-chamosite-glauconite sediments and the lowest in highly calcareous diatomaceous and biogenic deposits. Relatively high iron concentrations were also observed in glauconitic and volcanoclastic sediments and in pelagic ooze (red clay). The iron content in terrigenous and biogenic carbonate sediments increases in almost all cases from sand to pelitic ooze. In fine silty, silty-pelitic and pelitic ooze of the shelf zone, iron concentrations range from 1.93% to 6.50%, averaging 4.74% (32 samples). In ooze of the continental slope zone (depth of 200 to 4,500 m) iron concentrations range from 1.10% to 11.99%, averaging 5.14% (111 samples). In ooze of the basin zone (below 4,500 m) they range from 1.32% to 13.07%, averaging 5.61% (84 samples). Average concentrations of iron are much higher in sediments of the Atlantic than in those of the Black and Mediterranean Seas or in sedimentary rocks on land. Average iron content of Atlantic sediments is lower than that of Pacific sediments. In Pacific sediments particle-size distribution of iron is more uniform. Both differences are due to higher concentrations of volcanic material and decomposition products of igneous rocks in sediments of the Pacific. (Josefson-USGS)
W74-10257

ORIGIN OF CLAY MINERALS IN HOLOCENE BOTTOM SEDIMENTS OF THE SEA OF AZOV (O PROISKHOZHDENII GLINISTYKH MINERALOV SOVREMENNYKH DONNYKH OSADKOV AZOVSKOGO MORYA),
Ye. F. Shnyukov, and F. I. Kotlovskaya.
Akademiya Nauk SSSR Doklady, Vol 208, No 2, p 430-431, 1973. 1 fig, 1 tab, 4 ref.

Descriptors: *Petrology, *Sediments, *Bottom sediments, *Clay minerals, *Recent epoch, Dating, Age, Sedimentation rates, Mineralogy, Mapping.
Identifiers: *USSR(Sea of Azov), Ooze, Potassium-argon age method.

The rate of sedimentation in the Sea of Azov is relatively high. Sediment thickness ranges from 1.3 mm to 4 mm annually. The layer of semiliquid ooze is 5-10 m thick and in some places, for example, north of the Kerch' Strait, it is 35 m thick. Ooze covers most of the sea floor and is composed almost entirely (99%) of clay minerals, mainly hydromica and montmorillonite. Other minerals generally occur in very small concentrations. The age of clay minerals comprising bottom sediments of the sea is considerable and ranges from 233 to 360 million years. Clay minerals of bottom sediments are clastic forms derived from surrounding land and may have been redeposited several times before accumulating in the present area of the sea. (Josefson-USGS)
W74-10262

EVOLUTION OF THE SON DRAINAGE,
Saugar Univ. (India). Centre of Advanced Study in Geology.
S. Lakshmanan.
Proceedings of the Indian National Science Academy, Vol 38A, No 1, 2, p 21-31, January, 1972. 4 fig, 19 ref.

Descriptors: *Drainage, *Rivers, *Faulting, *Drainage systems, Geology, *Erosion, Flow, Tributaries, Hydrology, Petrology.
Identifiers: *India(Son Valley).

The present drainage of the Son valley area was superposed from a Deccan Trap cover, and the course of the Son river has been controlled by lithology and not by any major faulting. This was determined from a geological study of the western portion of the Son valley where the Son river takes an abrupt east northeast bend from its northerly course. Apparently there is a Pre-Trappean erosion surface at about 1600 ft above sea level, and the drainage appears to have originated on the Deccan Traps which were later denuded away to expose the underlying older formations. By a process of differential and headward erosion, all the northward flowing tributaries were finally captured to form the Son river. (Prague-FIRL)
W74-10285

2K. Chemical Processes

INTERFACIAL INTERACTION OF WATER AND SILICATE MINERALS,
Missouri Univ., Kansas City. Dept. of Physics.
J. M. Phillips, P. L. Gutshall, and M. Oglesby.
Available from the National Technical Information Service as PB-233 791 $3.75 in paper copy, $1.45 in microfiche. Completion Report, Missouri Water Resources Research Center, Columbia, July 1, 1974. 51 p, 7 fig, 2 tab, 10 ref, 3 append. OWRR A-057-MO(1), 14-31-0001-3825.

Descriptors: *Groundwater, Hydrologic cycle, *Silicates, Bonding, Minerology, Clays, Ions, Earth-water interfaces, Soil chemical properties, Soil physical properties.
Identifiers: *Selenite, *Interlay binding energy, Muscovite.

The study deals with the basic interactions of water with the surface of minerals. The problems of bonding and migration of water molecules upon sheet structures of mineral samples were investigated. The minerals used in the program have surface structures that are similar and in some cases identical to those found in clays. This study focused upon the molecular level rather than on the bulk property level of capillarity and hydraulics. The interlayer binding energy (IBE) of selenite was measured. The measurements were made within a test chamber in which the temperature and atmospheric pressure of the sample could be controlled and monitored. There was no significant difference in the IBE of selenite in air (716 ergs/cm2) and in vacuum (704 ergs/cm2). There was a slight difference in the low temperature IBE (720 ergs/cm2); however, this was attributable to effects of cold on the mechanism. It was concluded that the IBE is independent of atmospheric and temperature effects within the range of temperature and pressure studied. The IBE of ionic bound lamella of Muscovite Phlogopite, Margarite, and Xanthophyllite has been calculated. Temperature dependence of water mobilities has been studies in the cleavage chamber and in the Varian-MAT SM1-B high resolution, double focus mass spectrometer.
W74-09805

ASSOCIATION CONSTANTS OF ION PAIRS IN NATURAL WATERS,
Missouri Univ., Columbia. Dept. of Geology.
P. B. Hostetler, and W. R. Almon.
Available from the National Technical Information Service as PB-233 789 $4.00 in paper copy, $1.45 in microfiche. Completion Report, Missouri Water Resources Research Center, Columbia, Jun 5, 1974. 72 p, 7 fig, 4 tab, 15 ref, 2 append. OWRR A-043-MO(1), OWRR-14-31-0001-3225.

Descriptors: *Aqueous solutions, *Water chemistry, *Chemical properties, Equilibrium, Thermodynamic behavior, Ions, *Volumetric analysis, Hydrogen ion concentration, Enthalpy, Carbonates, Chemical analysis, Calcium.
Identifiers: *Association constants, *Ion pairs.

An experimental approach which is directly applicable to almost any system of the nature M+m.H2O.CO2 for the investigation of MHCO3 (m-1)+ and MCO3 (M-2)+ ion pairs in their appropriate pH ranges. The only limit is that significant imparing occurs before precipitation. The principal advantages of this system and (1) the experiments are arranged as pH titrations and (2) the ability to 'float' a 1HCO-3 to achieve convergence of the titration plots does away with the necessity for absolute values of the dissociation constants of carbonic acid. The technique allows ion pair formation constants to be calculated from the known mass balance equation of the titrant solutions and from the change in pH between consecutive steps in the titration. The use of delta pH between steps is a better measurement than the absolute pH as random errors tend to cancel out over the run. Thus the average log kp calculated from each run is a more reliable measurement than log kf values calculated from absolute pH. The experimental system can be expanded to almost any system of ion pairing or complexation in which there is a pH change during the reaction. The experimental system was applied to the CaCl2, CO2, H2O system and the formation constants of CaHCO+3 were determined from 10 degree to 90 degree C. The value obtained at 25 degree C agrees well with literature values and the enthalpies derived from the partial of log K with respect to T agree to a reasonable extent to enthalpies measured by solution calorimetry.
W74-09806

DETERMINATION OF NITRITE AND NITRATE IONS IN NATURAL WATERS USING AROMATIC ORTHO DIAMINES AS REAGENTS,
Wisconsin Univ., Green Bay. Ecosystems Analysis.
For primary bibliographic entry see Field 5A.
W74-09809

ANNUAL PROGRESS REPORT FOR THE PERIOD JULY 1971-JUNE 1972-NEW BRUNSWICK LABORATORY.
New Brunswick Lab. (AEC), N.J.
For primary bibliographic entry see Field 5A.
W74-09830

MOUND LABORATORY CHEMISTRY AND PHYSICS PROGRESS REPORT: JANUARY-MARCH 1972.
Mound Lab., Miamisburg, Ohio.
Available from NTIS, Springfield, Va., as Rept. No. MLM-1903. $4.00/copy, $1.45/microfiche. Report No. MLM-1903, October 1972. 25 p, 1 fig, 5 tab, 12 ref.

Descriptors: Research and development, *Chemical reactions, *Analytical techniques, Chemistry, Inorganic compounds, Tritium, Gases.
Identifiers: *Plutonium protactiniam, *Thorium, *Chemical recovery.

Progress is reported in separations chemistry, inorganic chemistry, and analytical chemistry. The recovery of protactinium-231 and thorium-230 is discussed. The problem of specifying solution conditions suitable for the formation of trivalent, tetravalent, pentavalent and hexavalent plutonium in identical concentrations is discussed, and a method of solving this multiple point problem is proposed. The suggestion is made that plutonium may exist in environmental waters in forms other than hydrated tetravalent plutonium hydroxide. Development of a method for the simultaneous determination of tritium gas and tritiated water vapor in air samples is continuing. A spectrographic procedure for the analysis of impurities in solution samples was developed. (Houser-ORNL)
W74-09860

MODELING FLOW AND CHEMICAL QUALITY CHANGES IN AN IRRIGATED STREAM-AQUIFER SYSTEM,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 5B.
W74-09883

THE MIXING PATTERNS OF THE JORDAN RIVER IN LAKE KINNERET,
Kinneret Limnology Lab., Tiberias (Israel).
For primary bibliographic entry see Field 2H.
W74-09890

SEASONAL VARIATION OF THE WATER MASS ALONG THE OREGON-NORTHERN CALIFORNIA COAST,
Oregon State Univ., Corvallis. School of Oceanography.
R. H. Bourke, and J. G. Pattullo.
Limnology and Oceanography, Vol 19, No 2, p 190-198, March 1974. 3 fig, 4 tab, 10 ref.

Descriptors: *Oceanography, *Salinity, *Water temperature, *Oregon, *California, Sea water, Mixing, Continental shelf, Currents(Water), Rivers, *Columbia River.

Temperature and salinity data collected at five Oregon-northern California coastal stations from 1960 to 1971 were used to assess the influence of local processes in modifying the water mass along the coast. A bivariate model was constructed for the summer and winter seasons at each coastal station, permitting a quantitative measure of the degree of importance of each process. In summer the dominant modifying process is different at each shore station with local heating, upwelling, and mixing with shelf water, slope water and Columbia River water being the major factors. In winter rainfall and runoff is the dominant process along the coast except near the northern border where mixing occurs slightly more frequently. In winter offshore surface waters within 81 km of the coast have nearly the same temperature and salinity as the waters at the coast. In summer offshore surface waters become cooler and more saline in the shoreward direction with the coolest and saltiest water occurring at the coast. (Knapp-USGS)
W74-09892

BICARBONATE AND CARBONATE ION-PAIRS AND A MODEL OF SEAWATER AT 25 C,
Oregon State Univ., Corvallis. School of Oceanography.
R. M. Pytkowicz, and J. E. Hawley.
Limnology and Oceanography, Vol 19, No 2, p 223-234, March 1974. 3 fig, 7 tab, 41 ref. NSF GA-17011 and GA-36057X ONR N00014-67-A-0369-0007.

Descriptors: *Bicarbonates, *Carbonates, *Seawater, *Carbon dioxide, *Water chemistry, *Equilibrium, Saturation, Ions, Anions, Cations, Polyelectrolytes, Salinity, Hydrogen ion concentration.
Identifiers: Association constants.

The apparent (stoichiometric) association constants for the formation of ion-pairs between bicarbonate and carbonate and the major cations of seawater at 25 deg C were determined experimentally. The results were used, in conjunction with earlier data on sulfate ion-pairs, to calculate

the concentrations of the major species present in seawater. (KnappiUSGS)
W74-09894

THE ION-ASSOCIATION MODEL AND THE BUFFER CAPACITY OF THE CARBON DIOXIDE SYSTEM IN SEAWATER AT 25 C AND 1 ATMOSPHERE TOTAL PRESSURE,
Marine Biological Association of the United Kingdom Plymouth (England). Plymouth Lab.
M. Whitfield.
Limnology and Oceanography, Vol 19, No 2, p 235-248, March 1974. 11 fig, 5 tab, 27 ref.

Descriptors: *Bicarbonates, *Carbonates, *Sea water, *Carbon dioxide, *Water chemistry, *Equilibrium, Saturation, Ions, Anions, Cations, Polyelectrolytes, Salinity, Hydrogen ion concentration.
Identifiers: Association constants.

The ion-association model of carbonate chemistry in seawater was extended to calculate the contributions of the various ion-pair formation reactions to the buffer capacity of the carbon dioxide system. These reactions make the major contribution to the equilibrium buffer capacity at pH values greater than 8. The indifference of the pH to quite large changes in solution composition arises because the metal-carbonate ion-pairs form only a small proportion of the total cation concentration under normal conditions. (Knapp-USGS)
W74-09895

GEOCHEMICAL INDICATORS OF SUBSURFACE TEMPERATURE--PART 1, BASIC ASSUMPTIONS,
Geological Survey, Menlo Park, Calif.
R. O. Fournier, D. E. White, and A. H. Truesdell.
Journal of Research of the U S Geological Survey, Vol 2, No 3, p 259-262, May-June 1974. 1 fig, 16 ref.

Descriptors: *Geochemistry, *Water temperature, *Geothermal studies, *Hot springs, Thermal springs, Thermal water, Mineral water, Water chemistry, Equilibrium, Silica.

The chemical and isotopic compositions of hot-spring water and gas may be used to estimate subsurface temperatures. The basic assumptions inherent in the methods include (1) a temperature-dependent reaction at depth, (2) a supply of the solid phase involved in the reaction to permit saturation of the constituent used for geothermometry, (3) water-rock equilibrium at depth, (4) negligible re-equilibration as the water flows to the surface, and (5) no dilution or mixing of hot and cold water. The first three assumptions are probably good for a few reactions that occur in many places. The last two assumptions probably are not valid for many hot-spring systems; information obtained is therefore for the shallower parts of those systems, or a limiting temperature (generally a minimum) is indicated. (See also W74-09915) (Knapp-USGS)
W74-09914

GEOCHEMICAL INDICATORS OF SUBSURFACE TEMPERATURE--PART 2, ESTIMATION OF TEMPERATURE AND FRACTION OF HOT WATER MIXED WITH COLD WATER,
Geological Survey, Menlo Park, Calif.
R. O. Fournier, and A. H. Truesdell.
Journal of Research of the U S Geological Survey, Vol 2, No 3, p 263-270, May-June 1974. 5 fig, 2 tab, 20 ref.

Descriptors: *Geochemistry, *Water temperature, *Geothermal studies, *Hot springs, Thermal springs, Thermal water, Mineral water, Water chemistry, Equilibrium, Silica.

The water in many warm springs with large rates of flow consists of mixtures of hot water that has come from depth and of shallow cold water. Under favorable conditions the original temperature of the hot water and the fraction of the cold water in the mixture can be estimated by using the measured temperature and silica content of the warm spring water and the temperature and silica content of nonthermal water in the region. The method has been applied with apparent success at Yellowstone National Park. (See also W74-09914) (Knapp-USGS)
W74-09915

THE CALCULATION OF AQUIFER CHEMISTRY IN HOT-WATER GEOTHERMAL SYSTEMS,
Geological Survey, Menlo Park, Calif.
A. H. Truesdell, and W. Singers.
Journal of Research of the U S Geological Survey, Vol 2, No 3, p 271-278, May-June 1974. 5 tab, 41 ref.

Descriptors: *Geochemistry, *Water temperature, *Geothermal studies, *Hot springs, *Computer programs, Thermal springs, Thermal water, Mineral water, Water chemistry, Equilibrium, Silica.
Identifiers: *New Zealand.

The temperature and chemical conditions (pH, gas pressure, and ion activities) in a geothermal aquifer supplying a producing bore can be calculated from the enthalpy of the total fluid (liquid + vapor) produced and chemical analyses of water and steam separated and collected at known pressures. Alternatively, if a single water phase exists in the aquifer, the complete analysis (including gases) of a sample collected from the aquifer by a downhole sampler is sufficient to determine the aquifer chemistry without a measured values of the enthalpy. The assumptions made are that the fluid is produced from a single aquifer and is homogeneous in enthalpy and chemical composition. Calculations of aquifer chemistry involving large amounts of ancillary information and many interations require computer methods. A computer program in PL-1 to perform these calculations is available from the National Technical Information Service as document PB-219 376. (Knapp-USGS)
W74-09916

OCCURRENCE OF DISSOLVED ORGANIC CARBON IN SELECTED GROUND-WATER SAMPLES IN THE UNITED STATES,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 5B.
W74-09917

AVERAGE RATIOS OF URANIUM AND ORGANIC MATTER IN RECENT MARINE AND OCEAN SEDIMENTS (O SOOTNOSHENII SREDNIKH KONTSENTRATSIY URANA I ORGANICHESKOGO VESHCHESTVA V SOVREMENNYKH MORSKIKH I OKEANSKIKH OSADKAKH),
For primary bibliographic entry see Field 2J.
W74-09935

SEPARATION OF CLAY MINERALS AND SOIL CLAYS USING ISOPYCNIC ZONAL CENTRIFUGATION,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-10125

A CAPILLARY TUBE DIFFUSION CELL FOR MEASURING ION DIFFUSION IN AQUEOUS SOLUTIONS,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
For primary bibliographic entry see Field 5A.
W74-10207

CALCITIZATION OF EDWARDS GROUP DOLOMITES IN THE BALCONES FAULT ZONE AQUIFER, SOUTH-CENTRAL TEXAS.
California State Univ., San Diego. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2F.
W74-10208

ARTIFICIAL WEATHERING OF OXIDIZED BIOTITE: IV. THE INHIBITORY EFFECT OF POTASSIUM ON DISSOLUTION RATE,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nturition.
For primary bibliographic entry see Field 2G.
W74-10209

THE EFFECT OF OVERBURDEN PRESSURE ON CHLORIDE AND WATER MOVEMENT IN SWELLING CLAY SOIL,
Texas Agricultural Experiment Station, College Station.
For primary bibliographic entry see Field 2G.
W74-10213

FORMATION OF CLAY-PROTEIN COMPLEXES,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 2G.
W74-10245

ADSORPTION OF LYSOZYME AND OVALBUMIN BY CLAY: EFFECT OF CLAY SUSPENSION PH AND CLAY MINERAL TYPE,
New Hampshire Univ., Durham. Inst. of Natural and Environmental Resources.
For primary bibliographic entry see Field 2G.
W74-10246

IRON IN ATLANTIC SEDIMENTS (ZHELEZO V OSADKAKH ATLANTICHESKOGO OKEANA),
Akusticheskii Institut, Moscow (USSR).
For primary bibliographic entry see Field 2J.
W74-10257

ORIGIN OF CLAY MINERALS IN HOLOCENE BOTTOM SEDIMENTS OF THE SEA OF AZOV (O PROISKHOZHDENII GLINISTYKH MINERALOV SOVREMENNYKH DONNYKH OSADKOV AZOVSKOGO MORYA),
For primary bibliographic entry see Field 2J.
W74-10262

ISOTOPIC AND CHEMICAL CHARACTERISTICS OF HIGH-LEVEL GROUNDWATER ON OAHU, HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 4B.
W74-10273

PRESERVATION OF SOIL SAMPLES FOR INORGANIC NITROGEN ANALYSES,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W74-10334

EFFECT OF ION-PAIR FORMATION ON THE SOLUBILITY PRODUCT,
California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
For primary bibliographic entry see Field 2G.
W74-10345

2L. Estuaries

RADIOACTIVITY IN SURFACE AND COASTAL WATERS OF THE BRITISH ISLES, 1971,
Ministry of Agriculture, Fisheries and Food, Lowestoft, (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 5D.
W74-09875

LONGSHORE SAND TRANSPORT INTTHE SURF ZONE ALONG THE MEDITERRANEAN EGYPTIAN COAST,
Alexandria Univ., (Egypt). Dept. of Oceanography.
S. H. Sharaf EL Din.
Limnology and Oceanography, Vol 19, No 2, p 182-189, March 1974. 5 fig, 17 ref.

Descriptors: *Sediment transport, *Deltas, *Sediment load, Sediment yield, Sedimentation, Littoral drift, Streamflow, Surf, Waves(Water), Sands, Tracers.
Identifiers: *Nile Delta(Egypt).

The Nile Delta coast has been altered considerably in its configuration during the last 100 years. The sediment load carried by the Nile during the flood season built up the two peninsulas of Damietta and Rosetta, but after 1900, the sediment load began to decrease and excessive erosion was noted. Tracer sand experiments were made along the coast in 1968 and 1971. There is some evidence that the movement of sand beyond the wave breaker zone is due only to currents generated by the wind, but inside the breaker zone it is due to longshore drift. The sediments, which generally vary from 0.25 to 0.15 mm in size, move mostly in suspension. Most of the eroded material finds its way into the Damietta inlet where it settles, forming a spit. (Knapp-USGS)
W74-09891

RESONANT AND NONRESONANT MOTION IN A SPINDLE-SHAPED BASIN WITH AN ENTRANCE,
Mitchell Coll. of Advanced Education, Bathurst (Australia).
For primary bibliographic entry see Field 2E.
W74-09893

HYDROGRAPHY OF THE CHESAPEAKE AND DELAWARE CANAL,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 4A.
W74-09944

THREE-DIMENSIONAL FLOW AND SEDIMENT TRANSPORT AT RIVER MOUTHS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
W. R. Waldrop, and R. C. Farmer.
Available from NTIS, Springfield, Va. 22151 AD-768 037 Price $4.50 printed copy; $1.45 microfiche. Lousiana State University Coastal Studies Institute Technical Report No 150, September 1973. 137 p, 11 fig, 8 tab, 60 ref, 4 append. ONR Contract N00014-69-A-0211-0003.

Descriptors: *Sediment transport, *Open channel flow, *Deltas, *Numerical analysis, Simulation analysis, Mathematical models, Turbulence, Convection, Suspended load, Sedimentation, Settling velocity, Finite element analysis, Computer programs.

Three-dimensional flow and sediment transport processes of a river emptying into the sea were analyzed. The basic equations derived to describe this flow include the effects of buoyancy caused by density differences between freshwater and saltwater, inertia of river and coastal currents, and differences in hydrostatic head throughout the mixing region. Turbulence effects were included through an appropriate eddy viscosity model. Combinations of river stages and tidal currents were represented as systems of steady-state flow fields. A numerical procedure was developed and implemented on a digital computer for the solution of the equations. This numerical procedure is an asymptotic time-dependent finite-difference technique but includes some features of a relaxation technique. Computed flow fields were used to track the suspended load of the river as determined from field data. Deposition of these particles was primarily governed by convective processes and particle settling velocities. Deposition rates were used to compute deltaic growth. (Knapp-USGS)
W74-09946

PUGET SOUND,
For primary bibliographic entry see Field 5C.
W74-09955

SAN FRANCISCO BAY,
For primary bibliographic entry see Field 5C.
W74-09956

BIG CYPRESS NATIONAL FRESH WATER RESERVE.
For primary bibliographic entry see Field 6E.
W74-10056

PROTECTION OF NATIONS WETLANDS--POLICY STATEMENT.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10062

SECTION 10 OF THE RIVERS AND HARBORS ACT: THE EMERGENCE OF A NEW PROTECTION FOR TIDAL MARSHES,
For primary bibliographic entry see Field 6E.
W74-10066

THE PATRIMONIAL SEA,
London School of Economics and Political Science (England).
For primary bibliographic entry see Field 6E.
W74-10067

HOW THE STUDY STANDS NOW: INVENTORY PHASE NEARLY COMPLETE; PLANNING PHASE BEGUN.
For primary bibliographic entry see Field 6B.
W74-10080

POSSIBLE EFFECT OF CHANGES IN HYDROGEOLOGIC CONDITIONS OF THE PITSUNDA PENINSULA ON PITSUNDA PINE TREES (O VOZMOZHNOSTI VLIYANIYA IZMENENIY GIDROGEOLOGICHESKIKH USLOVIY P-OVA PITSUNDA NA PITSUNDSKUYU SOSNOVUYU ROSHCHU),
For primary bibliographic entry see Field 3C.
W74-10224

EVALUATION OF TEXTURAL PARAMETERS AS BEACH-DUNE ENVIRONMENTAL DISCRIMINATORS ALONG THE OUTER BANKS BARRIER, NORTH CAROLINA,
Old Dominion Univ., Norfolk, Va. Dept. of Geophysical Sciences.
G. L. Schideler.
Southeastern Geology, Vol 15, No 4, p 201-222, April 1974. 11 fig, 1 tab, 29 ref.

Descriptors: *Beaches, *Dunes, *Dune sands, *Sedimentology, Provenance, Sediment sorting, Mineralogy, Aeolian soils, *Sediment transport, Sedimentation, *North Carolina.

The depositional environments of beach and dune sands were studied using textural parameter combinations in sediments of the Outer Bands barrier chain along the Middle Atlantic coast. Combinations of moment measures, maximum particle size, and total heavy mineral contents were evaluated in differentiating foreshore, berm, and dune populations. The more effective parameters in distinguishing beach and dune sands along the barrier are the less sensitive measures that reflect basic competence differentials between the aeolian and hydraulic regimes. The more sensitive parameters that reflect differences in component subpopulations are of more limited utility because of their greater susceptibility to bias induced by local physiography and source materials, sampling techniques, and analytical procedures. Comparisons of total heavy mineral contents are effective in differentiating adjacent foreshore-berm couplets and foreshore-dune couplets but ineffective in distinguishing berm-dune couplets. Relative differences in heavy mineral concentrations among the three populations reflect both the varying degrees of aeolian influence and the relative amounts of sediment interchange between populations. (Knapp-USGS)
W74-10247

COMPARATIVE ASPECTS OF COASTAL ZONE MANAGEMENT: BACKGROUND INFORMATION ON THE LAW OF TEXAS AND OTHER STATES IN VIEW OF THE COASTAL ZONE MANAGEMENT ACT OF 1972.
Texas Law Inst. of Coastal and Marine Resources, Houston.
For primary bibliographic entry see Field 6E.
W74-10272

GRAYS HARBOR ESTUARY, WASHINGTON; REPORT 1, VERIFICATION AND BASE TESTS. APPENDIX A: SUPPLEMENTARY BASE TEST DATA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-10317

DISINFECTION PRACTICES IN THE SAN FRANCISCO BAY AREA,
Wallace and Tiernan, Inc., San Francisco, Calif.
For primary bibliographic entry see Field 5D.
W74-10350

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

SOLUBILITIES OF CALCIUM SULFATE DIHYDRATE AT 25C IN BRACKISH WATERS AND THEIR CONCENTRATES: EFFECT OF CALGON ADDITIVE AND PREDICTIONS FOR REVERSE OSMOSIS PROCESSES,
Oak Ridge National Lab., Tenn.
L. B. Yeatts, P. M. Lantz, and W. L. Marshall.
Available from the National Technical Information Service, as ORNL-4914, $5.45 in paper copy, $1.45 in microfiche. Report ORNL-4914, September 1973. 64 p, 17 fig, 21 tab, 9 ref.

Descriptors: *Calcium sulfate, *Reverse osmosis, *Brackish water, Saturation, Precipitation, Solids, Solutions, Irrigation water, Saline waters, *Solubility, Wyoming, South Dakota, Arizona, *Desalination, Waste water treatment.
Identifiers: *Calgon, Commercial polyphosphate, Arizona(Wellton-Mohawk Canal), Gillette(Wyo.), Webster(So.Dak.).

The solubility of calcium sulfate dihydrate, a substance which can impede reverse osmosis (RO) processes by saturation precipitation in RO membrane pores, was determined at 25C in three typical brackish water compositions and their concentrates. These waters were synthetically prepared, and corresponded to compositions and concentrates of well waters used by the Office of Saline Water RO plants at Gillette, Wyoming, and Webster, South Dakota, and those of a post-irrigation water from the Wellton-Mohawk Canal in Arizona. A commercial solid polyphosphate preparation, Calgon, when added in small amounts (5-40 ppm in unconcentrated solutions) was shown to initially produce an apparent increase in the saturation concentration of hydrated CaSO4 (the solid phase). Latter (2-6 days), the solution concentration of CaSO4 decreased to near the expected solubilities in the in the absence of Calgon. The method of calculation of the solubility of CaSO4 and its hydrates in various saline waters, which has been used successfully for several years, is found to apply equally well to the calculation of saturation limits of hydrated CaSO4 in the present waters and concentrates. (Prague-FIRL)
W74-10036

3B. Water Yield Improvement

THE RIGHT CHEMICALS ARE ABLE TO RESTORE OR INCREASE WELL YIELD, PART II,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 8G.
W74-10085

RESISTIVITY METHODS IN PROSPECTING FOR GROUND WATER,
Kansas State Univ., Manhattan. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-10100

PROTECTION AGAINST HAILSTORMS IN MOLDAVIA,
L. A. Dinevich.
Available from NTIS, Springfield, Va 22151 as AD-773 523 Price $4.00 printed copy; $1.45 microfiche. Air Force Foreign Technology Division Translation Report FTD-HT-23-720-74, January 1974. 1 fig. (Translated from Nauchno-Populyarnyy Gidrometeorologicheskiy, Sbornik, Chelovek i Stikhiyo, p 174-175, 1972.)

Descriptors: *Hail, *Weather modification, *Cloud seeding, Precipitation(Atmospheric), Silver iodid, Lead, Weather, Cloud physics, Radar.
Identifiers: Rockets, *USSR(Moldavia).

The geographical location and relief of Moldavia, USSR, favors the development of massive cumulus-nimbus clouds and the formation of hail. In Moldavia antihail research was initiated in 1964. First, the hail-menacing clouds were detected by radar. Their coordinates and parameters were transmitted to the command post of the branch where the degree of potential hail hazard of the clouds was determined, and a solution was made for the necessary action to be taken. Orders were given to the appropriate rocket launch points by radio. The 'Oblako' rocket is a flying generator which atomizes additional artificial sublimation nuclei in the cloud. (Knapp-USGS)
W74-10232

SUMMARY REPORT--WEATHER MODIFICATION, FISCAL YEARS 1969, 1970, 1971,
GEOMET, Inc., Rockville, Md.
R. C. Koch, P. A. McGrath, M. W. Chandler, and D. J. Pelton.
Available from Sup Dok, GPO, Washington, D.C. 20402-Price $1.25. National Oceanic and Atmospheric Administration Publication, May 1973. 163 p, 29 fig, 182 ref.

Descriptors: *Weather modification, *Artificial precipitation, *Reviews, *Research and development, Cloud seeding, Cloud physics, Meteorology, Climatology, Precipitation(Atmospheric).

A summary report of domestic and foreign weather modification activities is presented for the fiscal years 1969, 1970, and 1971. The activities covered include observational and experimental studies in the field and in the laboratory. The weather phenomena include rainfall, snowfall, hurricanes, tornadoes, hailstorms, and fog. Progress in evaluating social, economic, legal, and ecological aspects is considered in addition to the technical aspects. The promising weather modification technology of the preceding decade failed to produce the expected benefits. As a result of investigations and needs for more detailed measurements of clouds and storms, much more detailed field investigations were carried out, and a greater understanding of the cloud and precipitation physics that control weather began to evolve. Refinements were also introduced to the technology of weather modification in this period. By the end of the decade, scientists had learned a great deal about how to apply available technology to modify the weather. Detailed field investigations are now being made, both to evaluate the available modification techniques and to provide more information about cloud physics and about how to improve the modification techniques. (Knapp-USGS)
W74-10233

EXPERIMENTAL AND THEORETICAL INVESTIGATIONS OF ARTIFICIAL CRYSTALLIZATION AND DISPERSAL OF SUPERCOOLED CLOUDS,
I. I. Gayvoronskiy, S. N. Dubinchuk, L. I. Krasnovskaya, A. V. Levin, and V. N. Podgurskaya.
Available from NTIS, Springfield, Va. 22151 as AD-773 294 Price $4.00 printed copy; $1.45 microfiche. Air Force Foreign Technology Division Translation Report FTD-MT-24-225-74, 1974. 13 p, 4 tab, 20 ref. (Translated from Trudy v Vsesoyuznogo Meteorologicheskogo S'yezda, Sektsiya Aktivnykh Vozdeystviy na Atmosfernyye Protsessy, Gidrometeoizdat, Leningrad, Vol 4, p 164-172, 1972),

Descriptors: *Cloud seeding, *Weather modification, *Cloud physics, Fog, Meteorology, *Crystallization.
Identifiers: *USSR.

Systematic experiments on the artificial crystallization of supercooled stratified clouds were initiated in the USSR in 1954 at the Central Aerological Observatory and in 1959 at the Ukrainian Scientific Hydrometeorological Institute. Propagation of artificial crystallization in supercooled stratified clouds, conditions of cloud formation, the procedure for introduction of the reagent, and the norm of seeding were studied. The expansion time of the zone of crystallization in the predominant majority of the cases is 30-40 minutes, and the maximum width of the zone varies within limits of 1400-4300 m. In clouds of small thickness (up to 300 m) the best visibility is observed at the edges of the zone, and retained in the center is a dense crystal mist, which makes visibility worse through the zone. (Knapp-USGS)
W74-10234

AIRBORNE MEASUREMENTS OF THE SIZE DISTRIBUTION AND THE CONDENSATION AND ICE NUCLEATING ABILITY OF PARTICLES PRODUCED BY AGI CONTAINING PYROTECHNICS AND ACETONE SOLUTION BURNERS,
Pacific-Northwest Lab., Richland, Wash.
A. J. Alkezweeny, and L. F. Radke.
Available from the National Technical Information Service as BNWL-SA-4716 $3.00 in paper copy, $1.45 in microfiche. Report No BNWL-SA-4716, August 1973. 13 p, 5 fig, 1 tab, 15 ref. Conf-730936--1. AEC Contract AT(45-1)1830.

Descriptors: *Cloud seeding, *Particle size, *Silver iodide, *Nucleation, *Weather modification, Aircraft, Measurement.

The size distribution and nucleating activity of particles generated by both AgI pyrotechnic flares and AgI-NH4I acetone solution burners were measured. The pyrotechnic flares produced particles generally larger than 0.1 micrometer in diameter which were good cloud condensation nuclei. Particles produced by the AgI-acetone burners were less than 0.1 micrometer in diameter and, by comparison with the pyrotechnic flares were relatively inefficient both as ice nuclei and cloud condensation nuclei. (Knapp-USGS)
W74-10239

REACTION OF HYGROSCOPIC PARTICLES TO A WARM FOG,
Navy Weather Research Facility, Norfolk, Va.
E. E. Hindman, II, and P. M. Tag.
Available from NTIS, Springfield, Va 22151 as AD-761 998. Price $3.00 printed copy; $1.45 microfiche. Technical Paper No 7-70, June 1970. 4 p, 2 fig, 1 ref.

Descriptors: Fog, *Weather modification, *Computer models, *Cloud seeding, Coalescence, Cloud physics, Particle size.
Identifiers: *Warm fog, *Fog dissipation.

A warm-fog computer model simulates the effect of introducing manmade hygroscopic particles into warm fog. Particle growth is by condensation and coalescence. The model is used to study warm-fog dissipation using salt particles and brine sprays, and comparisons between model results and field experiments indicate agreement. (Knapp-USGS)
W74-10253

CLOUD-PARTICLE SAMPLES AND WATER CONTENTS FROM A 1969 STORMFURY CLOUDLINE CUMULUS,
Navy Weather Research Facility, Norfolk, Va.
E. E. Hindman, II.
Available from NTIS, Springfield, Va 22151 as AD-761 997 Price $3.00 printed copy; $1.45 microfiche. Technical Paper No 5-70, May 1970. 9 p, 3 fig, 7 ref.

Descriptors: *Sampling, *Cloud seeding, *Weather modification, Particle size, Ice, Raindrops, Equipment, Instrumentation.

Liquid- and ice-water contents were measured in seeded portions of hurricanes and cloudline cumulus clouds. Aircraft are equipped with Formvar and foil-particle impactors. Cloud particles blast through a small slit and embed in liquid Formvar on rapidly moving 16-mm film. The Formvar hardens shortly after exposure and permanent fossils of the particles are produced. The smallest size particle which can be viewed is approximately 2 microns in diameter. In the foil sampler, a strip of aluminum foil moves slowly past a large sampling orifice equipped with a shutter. The shutter exposes the foil for only an instant, preventing particles from landing on one another. The particles leave distinct indentations in the foil. Particles larger than 200 microns in diameter can be viewed. Ice and water particles can be differentiated with some uncertainty. (Knapp-USGS)
W74-10254

ENGINEERING FOG-MODIFICATION EXPERIMENTS BY COMPUTER MODELLING,
Navy Weather Research Facility, Norfolk, Va.
P. M. Tag, D. B. Johnson, and E. E. Hindman, II.

Available from NTIS, Springfield, Va 22151 AD-760 675 Price $3.00 printed copy; $1.45 microfiche. Technical Paper No 1-70, January 1970. 29 p, 8 fig, 1 tab, 11 ref.

Descriptors: *Fog, *Weather modification, *Computer models, *Cloud seeding, Coalescence, Mathematical models, Cloud physics.
Identifiers: *Warm fog, *Fog dissipation.

A numerical model provides quantitative simulation of a wide range of warm-fog treatment materials and permits quantitative assessment of the results of such treatments. In addition, a variation of this model simulates the dissipation of cold fog using ice-phase treatments. (Knapp-USGS)
W74-10255

3C. Use Of Water Of Impaired Quality

PREDICTING OPTIMUM DEPTH OF PROFILE MODIFICATION BY DEEP PLOWING FOR IMPROVING SALINE-SODIC SOILS,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
For primary bibliographic entry see Field 2G.
W74-09812

ARID ZONE IRRIGATION,
For primary bibliographic entry see Field 3F.
W74-09815

IRRIGATION, DRAINAGE AND SALINITY.
Hutchinson and Co. Ltd. (Publishers), London, England. 1973. 510 p.

Descriptors: *Irrigation, Irrigaton effects, Irrigation water, *Drainage, Salt balance, *Saline soils, Saline water, *Salinity, Soil chemistry.

Irrigation in arid zones has often led to soil salinization. With the increase of the world's population and the rapid development of irrigated areas, this problem becomes more and more urgent. Not only must unproductive lands be placed under cultivation, but the productivity of irrigated areas must also be maintained. The experience gained in recent decades, along with a research which has been conducted regarding irrigation, drainage, and salinity, have produced a great variety of data. A compendium is presented of material prepared by numerous investigators throughout the world. The book not only covers the development of scientific knowledge, but also provides practical guidelines for field solutions. (Skogerboe-Colorado State)
W74-09821

RENOVATION OF SECONDARY EFFLUENT FOR REUSE AS A WATER RESOURCE,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-10197

A DEMONSTRATION OF THERMAL WATER UTILIZATION IN AGRICULTURE,
Eugene Water and Electric Board, Oreg.
For primary bibliographic entry see Field 5D.
W74-10199

POSSIBLE EFFECT OF CHANGES IN HYDROGEOLOGIC CONDITIONS OF THE PITSUNDA PENINSULA ON PITSUNDA PINE TREES (O VOZMOZHNOSTI VLIYANIYA IZMENENIY GIDROGEOLOGICHESKIKH USLOVIY P-OVA PITSUNDA NA PITSUNDSKUYU SOSNOVUYU ROSHCHU),
A. V. Zhuravlev.
Vodnyye Resursy, No 2, p 164-169, 1974. 1 fig, 1 ref.

Descriptors: *Hydrogeology, *Groundwater, *Saline water intrusion, *Saline water-freshwater interfaces, *Pine trees, Water types, Water chemistry, Hydrodynamics, Drainage effects, Salt tolerance.
Identifiers: *USSR(Abkhazia), *Pitsunda Peninsula(USSR), Water exchange, Mineralization.

Present-day hydrodynamic and hydrochemical conditions on the Pitsunda Peninsula (Abkhazia), formed after start of operation of the drainage system, are examined. Over most of the area of Pitsunda pine, which covers 350 ha, variable groundwater and salt regimes have no adverse effect on pine growth. On the basis of available data, the Pitsunda pine is assumed to have a relatively high salt tolerance. Basic directions of investigations on this problem are outlined. (Josefson-USGS)
W74-10224

TRICKLE IRRIGATION SOIL WATER POTENTIAL AS INFLUENCED BY MANAGEMENT OF HIGHLY SALINE WATER,
Utah State Univ., Logan.
P. Tscheschke, J. F. Alfaro, J. Keller, and R. J. Hanks.
Soil Science, Vol 117, No 4, p 226-231, 1974. 5 fig, 2 tab, 5 ref.

Descriptors: *Irrigation, *Investigation, *Soil water, Salts, Water quantity, Soil chemistry, Soil contamination, Root zone, Soil profile, *Saline water, Experimentation, Salt tolerance, *Tomatoes.
Identifiers: *Trickle irrigation, Salt accumulation.

The purpose was to determine the soil water potential and salt patterns in uniform soil profiles as a result of four different water management treatments. Cherry tomato plants were irrigated: daily with a volume of water equal to that used by the plant on the previous day; every other day with volumes of water being equal; below the water evapotranspired; and above the water evapotranspired. Although trickle irrigation offers the possibility of good yields when nontoxic highly saline water is used to irrigate, accumulated salts in the root zone may be a potential hazard. Soil water potential decreased in the soil profile as a result of salt accumulation with increased distance from the trickle source. The highest salt concentration occurred in the profiles irrigated with volumes of water below that evapotranspired by the tomato plants, indicating the importance of avoiding under irrigation when highly saline water is used with trickle irrigation. In addition, higher soil water potentials and higher yields resulted from irrigating with volumes above the evapotranspiration. (Prague-FIRL)
W74-10292

SALT TOLERANCE OF MEXICAN WHEAT: I. EFFECT OF NO3 AND NACL ON MINERAL NUTRITION, GROWTH, AND GRAIN PRODUCTION OF FOUR WHEATS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
B. C. Torres, and F. T. Bingham.
Soil Science Society of America Proceedings, Vol 37, No 5, p 711-715, September-October, 1973. 5 fig, 8 tab, 15 ref.

Descriptors: *Fertility, *Crop response, *Salinity, Nutrients, *Nitrogen, Crop production, Soil chemical properties, Crops, *Wheat, *Salt tolerance.
Identifiers: *Mexican wheat.

Wheat plants were grown to full maturity under sand culture conditions with variable levels of substrate NO3 and NaCl. Leaf samples were collected at early spike emergence for chemical analysis of Ca, Mg, Na, K, P, Cl, NO3, and total N. Growth measurements included those of flag leaf length, tiller and spike formation, and total straw and grain. The slower maturing variety, Cajeme 71, grew much more vigorously than the more rapidly maturing varieties Inia 66, Yecora, and Siete Cerros. The salt tolerance of Cajeme 71 was 2- to 4-fold greater than that of the other varieties tested. Leaf NO3 of samples collected at early spike emergence correlated with grain yields irrespective of substrate NaCl levels, suggesting that the growth retardation associated with excessive substrate NaCl was due in part to a Cl-induced NO3 deficiency. (Skogerboe-Colorado State)
W74-10328

INFLUENCE OF SALINITY ON FE, MN, AND ZN UPTAKE BY PLANTS,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
E. V. Maas, G. Ogata, and M. J. Garber.
Agronomy Journal, Vol 64, No 6, p 793-795, November-December, 1972. 3 fig, 10 ref.

Descriptors: *Salinity, *Crop response, Crop production, Tomato, Soybean, Nutrients, Nutrient removal, Hydroponics, *Iron, *Zinc, *Manganese, Sodium chloride, Absorption.
Identifiers: Squash.

The influence of salinity was determined on the uptake of Fe, Mn, and Zn by plants during the period of rapid vegetative growth. Relatively few data are available on the micronutrient states of salt-stunted plants. Tomato, soybean, and squash were grown in the greenhouse in half-strength Hoagland's solution salinized with 0, 25, 50, 75, and 100 meq NaCl/liter. Concentrations of Fe and Zn increased in the roots and tops of each species with increasing ambient levels of NaCl. Manganese concentrations increased in tomato and soybean tops but decreased in squash tops. Concentrations of Mn in the roots of tomato and squash were reduced at all salt levels, but they increased in all but the 100 meq/liter treatment in soybean. The changes in contents as a function of salinity were in the order of twofold or less and all were significant at the 5% level or better. (Skogerboe-Colorado State)
W74-10336

NITROGEN, SALINITY, AND ACIDITY DISTRIBUTION IN AN IRRIGATED ORCHARD SOIL AS AFFECTED BY PLACEMENT OF NITROGEN FERTILIZERS,
Philippines Univ., Laguna. Coll. of Agriculture.
B. C. Felizardo, N. R. Benson, and H. H. Cheng.
Soil Science Society of America Proceedings, Vol 36, No 5, p 803-808, September-October, 1972. 6 fig, 2 tab, 13 ref.

Descriptors: *Nutrient removal, *Leaching, *Fertilizers, *Nitrogen, *Salinity, *Acidity, Fertilization, Application methods, Drainage effects, Environmental effects, *Orchards.

Vertical and lateral changes were determined in the distribution of nitrogen, salinity, and acidity occurring in an irrigated orchard soil following addition of (NH4) 2SO4, NH4NO3, or Ca(NO3)2 by broadcast, in broad band, or in narrow band. The NH4 and NO3 contents in soil decreased rapidly even under narrow band placements. Considerable nitrate movement was observed. After 1 year, neither the total nor the inorganic N level in the fertilized plots was significantly different from that of the control. High salinity was detected under the narrow band placements, but the level diminished rapidly with time. Little salinity was evident under the broad band or broadcast placements. However, the acidity produced by the ammonium fertilizers persisted after 1 year. Changes in soil properties under narrow bands were drastic, whereas changes under broad bands were insignificant. (Skogerboe-Colorado State)
W74-10343

3D. Conservation In Domestic and Municipal Use

EVALUATION AND IMPLEMENTATION OF URBAN DRAINAGE AND FLOOD CONTROL PROJECTS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6B.
W74-09802

A PRELIMINARY REPORT ON URBAN HYDROLOGY AND URBAN WATER RESOURCES: OAHU, HAWAII,
Hawaii Unin., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 2A.
W74-09803

VACUUM SEWAGE TRANSPORT AND TREATMENT IN RURAL AREAS IN DENMARK,
Electrolux A/S (Denmark).
For primary bibliographic entry see Field 5D.
W74-10175

3E. Conservation In Industry

ECONOMIC ANALYSIS OF WATER SUPPLY NEEDS AND ALTERNATIVES IN A MULTI-COUNTY INDUSTRIAL AREA,
Clemson Univ., Dept. of Agricultural Economics and Rural Sociology.
For primary bibliographic entry see Field 6D.
W74-09808

PROJECT RIO BLANCO: PROMPT ECOLOGICAL EFFECTS RESULTING FROM GROUND MOTION,
Geonuclear Corp., Las Vegas, Nev.
For primary bibliographic entry see Field 5C.
W74-09831

ELECTRICAL ENERGY AND ITS ENVIRONMENTAL IMPACT - PROGRESS REPORT, DECEMBER 31, 1972.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5C.
W74-09836

RADIOLOGICAL MONITORING PROGRAM--PERIOD COVERING MAY 17, 1973, THRU JULY 31, 1973, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Sante Fe, N.Mex. Santa Fe Lab.
For primary bibliographic entry see Field 5B.
W74-09878

INTEGRATED SYSTEMS FOR UTILIZING WASTE HEAT FROM STEAM ELECTRIC PLANTS,
Oregon State Univ., Corvallis. Dept. of Soil Science.
For primary bibliographic entry see Field 5D.
W74-09920

WATER DEMANDS FOR EXPANDING ENERGY DEVELOPMENT,
Geological Survey, Reston, Va.
For primary bibliographic entry see Field 6D.
W74-09949

HIGH-RATE FILTRATION,
CH2M/Hill, Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W74-10015

THE PUDSEY PROJECT,
For primary bibliographic entry see Field 5D.
W74-10041

REUSE AND RECYCLE OF WATER IN INDUSTRY,
Bostock, Hill and Ribgy Birmingham, (England).
For primary bibliographic entry see Field 5D.
W74-10051

OUTER CONTINENTAL SHELF OFF FLORIDA--POSSIBLE OIL AND GAS LEASING.
Department of the Interior, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10061

A THEORETICAL STUDY OF GEOTHERMAL ENERGY EXTRACTION,
Los Alamos Scientific Lab., N. Mex.
For primary bibliographic entry see Field 4B.
W74-10087

3F. Conservation In Agriculture

IMPROVING WATER MANAGEMENT EFFICIENCY THROUGH USE OF BIO-INDICATORS,
Kansas Agricultural Experiment Station, Manhattan.
For primary bibliographic entry see Field 2D.
W74-09804

PRELIMINARY OBSERVATIONS ON THE USE OF FERTIGATION... NEBRASKA STYLE,
R. R. Volk.
Irrigation Age, Vol 6, No 8, p 28-29, 32, March, 1972. 1 fig, 1 tab.

Descriptors: *Fertilization, *Application methods, Crop response, Corn(Field), *Irrigation, Timing, Farm management, *Nebraska, Clay loam.

A study of present forms of fertilizer application vs. 'fertigation' was carried out at the University of Nebraska Mead Field Laboratory in the summer of 1971 on a silty clay loam soil. The study compared sidedress and irrigation water applied nitrogen solution. All plots received equal amounts of water and were planted to the same hybrid corn. Sprinkler applied nitrogen was uniformly extracted throughout the soil profile by the corn plants in all treatments. The check had the highest amount of nitrates removed at the four foot depth. This means the corn was in need of more nitrogen and the amount of starter supplied was not sufficient. The study did not determine yield differences between sidedress and irrigation water applied nitrogen. (Skogerboe-Colorado State)
W74-09814

ARID ZONE IRRIGATION,
B. Yaron, E. Danfors, and Y. Vaadia.
Springer-Verlag, New York Heidelberg, Berlin. 1973. 434 p.

Descriptors: *Arid lands, *Irrigation, *Irrigation practices, Salinity, Salt balance, Soil chemistry, Soil physics, *Soil-water-plant relationships, *Water requirements.

Irrigation fundamentals in arid and semi-arid zones are presented. The basic principles governing irrigation technology are described. This book, written by a large number of specialists and covering a broad spectrum of different disciplines, is a synthesis of general up-to-date information, and the results of the author's own research. Topics include water resources, soil-water-plant relationships, chemistry of irrigated soils, field investigations, soil and water salinity, irrigation practices and crop water requirements. (Skogerboe-Colorado State)
W74-09815

DRAINAGE AND WATER MANAGEMENT IN HUNGARY,
Agricultural Research Service, Riverside, Calif.
For primary bibliographic entry see Field 2G.
W74-09816

DO I REALLY NEED TO IRRIGATE TODAY, PART 1,
C. H. Davis.
Irrigation Age, Vol 6, No 7, p 61-62, 64, February, 1972. 1 fig.

Descriptors: *Irrigation practices, *Soil moisture, Crop response, Irrigation, Irrigation design, Timing.

A non-technical method for determining when to irrigate is presented. The method is based on average soil moisture holding capacity for soil types. The moisture content is determined using electronic soil moisture probes. (See also W74-09819) (Skogerboe-Colorado State)
W74-09818

DO I REALLY NEED TO IRRIGATE TODAY, HOW MUCH WATER FOR THIS IRRIGATION,
C. H. Davis.
Irrigation Age, Vol 6, No 8, p 20, 22, 26, March, 1972. 2 fig, 1 tab.

Descriptors: *Irrigation practices, *Irrigation programs, Soil moisture, Crop response, Irrigation systems, Irrigation water, Stress.

A non-technical method for estimating the amount of water required for a given irrigation is presented. The method is based on estimates of the water holding capacity of a soil according to the basic soil texture. Soil moisture content is determined by the feel of the soil or by electronic moisture meters. (See also W74-09818) (Skogerboe-Colorado State)
W74-09819

SPRINKLIGATION AS SEEN AND DONE BY THE OPERATOR...THE MAN AND THE QUALITY OF THIS LABOR DETERMINES THE SUCCESS OF THE SPRINKLER IRRIGATION OPERATION,
Irrigation Age, Vol 6, No 6, p 10-24, January, 1072. 12 fig,

Descriptors: *Irrigation practices, Surface irrigation, *Sprinkler irrigation, *Irrigation systems, Irrigation design, *Application equipment.

The field of sprinkler irrigation is reviewed. The various types of systems are discussed including: hand move, solid set, wheel move, and center pivot systems. The importance of proper management is stressed. (Skogerboe-Colorado State)
W74-09820

IRRIGATION, DRAINAGE AND SALINITY.
For primary bibliographic entry see Field 3C.
W74-09821

DRIP IRRIGATION DEVELOPER IN ISRAEL MAKES DEAL TO MARKET SYSTEM IN U.S.
Irrigation Age, Vol 6, No 7, p 14-16, 39-40, February, 1972.

Descriptors: *Irrigation practices, *Irrigation systems, Surface irrigation, Irrigation, Irrigation design, United States.
Identifiers: *Israel, *Trickle-root irrigation.

A new development in irrigation, developed and perfected in Israel, will be introduced on a major scale in the United States. Symcha Blass of Tel

Aviv, originator of trickle-root irrigation widely utilized in Israel and the Netafim Drip Irrigation firm, its manufacturer, signed a licensing agreement in September with industrialist Howard Klein of Washington, D.C., who heads an agrotechnical organization formed to install this system throughout the United States. (Skogerboe-Colorado State)
W74-09822

EFFECTS OF SURFACTANTS APPLIED TO SAMPLES OF SOLONETZ SOIL ON WATER PENETRATION AND PLANT GROWTH,
Department of Agriculture, Vegreville (Alberta). Solonetzic Soil Sub-Station.
R. R. Cairns.
Can J Soil Sci. Vol 52 No 2 p 267-269, 1972.
Identifiers: *Barley, Growth, Magnesium, Potassium, *Surfactants, Toxicity, Uptake, *Solonetz soils, Sampling.

The results of a study do not support the idea that surfactants in general might increase the rate of water penetration into Solonetz soil, but do indicate that their application at substantial rates could cause problems in plant nutrition. There was generally a toxic reaction in barley seedlings, K and Mg uptake were lowered.--Copyright 1973, Biological Abstracts, Inc.
W74-10044

COST OF RURAL COMMUNITY WATER AND SEWER SYSTEMS COMPARED TO PRIVATE SYSTEMS,
South Dakota State Univ., Brookings. Agricultural Cooperative Extension Service.
For primary bibliographic entry see Field 6C.
W74-10098

THE STATES ENTER THE RURAL WATER PICTURE,
Conset, Inc., Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10106

FEEDLOT WASTE MANAGEMENT: PROGRESS AND OUTLOOK,
Texas A and M Univ., College Station. Dept. of Agricultural.
For primary bibliographic entry see Field 5D.
W74-10133

A SIMILARITY DURING EARLY STAGES OF RAIN INFLITRATION,
Hawaii Univ., Honolulu. Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W74-10205

TIME-DEPENDENT LINEARIZED INFILTRATION. I. POINT SOURCES,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 2G.
W74-10217

PREDICTION OF WATER LOSS FROM A FALLOW FIELD SOIL BASED ON SOIL WATER FLOW THEORY,
Agricultural Research Service, Fort Collins, Colo.
For primary bibliographic entry see Field 2D.
W74-10218

METHODS OF CALCULATION OF EVAPORATION AND WATER REGIME IN THE ROOT ZONE OF SOIL ON WATERSHED (METODY RASCHETA ISPARENIYA I VODNOGO REZHIMA KORNEOBITAYEMOGO SLOYA POCHVY NA VODOSBORAKH),
For primary bibliographic entry see Field 2D.
W74-10227

REFLECTANCE OF VEGETATION, SOIL, AND WATER,
Agricultural Research Service, Weslaco, Tex.
For primary bibliographic entry see Field 7B.
W74-10252

UNCERTAINTY ANALYSIS IN THE ECONOMIC EVALUATION OF IRRIGATION SYSTEMS,
Bradford Univ. (England).
D. Nudds, I. G. Simpson, and A. Bottomley.
The Institution of Civil Engineers, Proceedings, Part 2, Research and Theory, Vol 55, p 659-664, September 1973. 4 fig, 1 tab.

Descriptors: *Irrigation programs, *Irrigation efficiency, *Probability, *Risks, Evaluation, Monte Carlo methods, Measurement, Crops, Prices, Costs, Mathematical models, Systems analysis.
Identifiers: *Economic analysis.

Economic analysis is made of an Arabian irrigation scheme, using the standard approach of comparing different scheme designs by producing a single figure as a measure of the worth of the project, in this case the scheme's internal rate of return (IRR). The IRR is calculated from a theoretical model of the system, involving estimated values for such quantities as areas irrigated, water flows, efficiencies, yields, costs, and prices. Each data item is set at its estimated value. Probabilistic streamflow data are subjected to statistical analysis to obtain estimates for the areas under cultivation. The final IRR calculated is an average value based on most likely and mean values.. In the end, therefore, a number is obtained that is valid for comparing similar scheme designs, but which cannot be the IRR and which cannot be described as the most likely or mean IRR; it is a number calculated from most likely or mean data. This distinction arises from three causes, two of which are dealt with here: (1) the estimated data values used in the calculation will not be all correct in practice; and (2) the areas irrigated each year will not be the mean areas which form the basis of the calculations. Risk analysis is performed to examine and quantify the effects of these causes. Monte Carlo methods are utilized to quantify the variability in the actual data flow. (Bell-Cornell)
W74-10321

SUBSURFACE IRRIGATION IN HAWAIIAN SUGARCANE,
Hawaiian Sugar Planters' Association Experiment Station, Honolulu.
C. M. Vaziri.
Paper No 72-740 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972, Chicago, Illinois. 11 p, 6 fig, 5 tab.

Descriptors: *Irrigation, *Subsurface irrigation, Irrigation practives, *Sugarcane, *Hawaii, Irrigation engineering.

The first successful subsurface irrigation system for sugarcane was installed on March 29, 1970, at HSPA Kunia Substation in an 8,000 square foot area. The field was harvested on November 3, 1971. After harvest, the system was inspected and found to be functioning adequately. Field results indicate water savings and yield increase. (Skogerboe-Colorado State)
W74-10326

CULTURAL PRACTICES FOR IRRIGATED WINTER WHEAT PRODUCTION,
Southwestern Great Plains Research Center, Bushland, Tex.
P. W. Unger, R. R. Allen, and J. J. Parker.
Soil Science Society of America Proceedings, Vol 37, No 3, p 437-442, May-June, 1973. 5 tab, 21 ref.

Descriptors: *Cultivation, *Irrigation, Infiltration, Efficiencies, Organic matter, *Nitrogen, Bulk density, *Wheat, Water utilization, *Fertilizers.

Rototilling, moldboard plowing, disking, burn-listing, and listing were satisfactory tillage methods for managing the residues produced by continuous irrigated winter wheat. Grain yields averaged highest for moldboard plowing and lowest for lister plowing. Nitrogen fertilizer at 90 or 135 kg N/ha resulted in significant grain and residue yield differences in a few years, but no consistent trends were apparent. Irrigation water infiltration was highest for moldboard plowing and lowest for lister plowing. The list and burn-list treatment resulted in similar infiltration. Water-use efficiencies were similar for all treatments. At the end of the 5-year study, soil organic matter content was lowest (1.66%) for burn-lister tillage and highest (1.72%) for lister and disk tillage. Water-stable aggregation was highest (84.5%) for rototilling and lowest (79.3%) for burn-lister tillage. Bulk density increased in all plots, but it increased the least in plots that were moldboard plowed. (Skogerboe-Colorado State)
W74-10327

PRINCIPLES OF MANAGING HIGH FREQUENCY IRRIGATION,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
S. L. Rawlins.
Soil Science Society of America Proceedings, Vol 37, No 4, p 626-629, July-August, 1973. 3 fig, 6 ref.

Descriptors: *Irrigation practices, *Irrigation, Irrigation systems, Irrigation design, Sprinkler irrigation, Soil physics, Soil science.

The consequences of increasing irrigation frequency are explored, taking into consideration the laws giverning water flow in soil. As frequency increases, the waterholding capacity of the soil becomes less important because water is supplied as the plants require it. Soil water content, and therefore matric potential, are continuously high and only slightly dependent upon deep percolation rate. This makes the need for deep percolation to leach salts the only valid criterion for applying more water than the plants transpire. The need to apply extra water to those crops that require high soil water content is eliminated. Controlling the deep percolation rate rather than the soil water status requires measurements of flux rather than water potential as inputs for managing the quantity of water to be applied. (Skogerboe-Colorado State)
W74-10331

SOIL MULCH EFFECTS ON SEEDBED TEMPERATURE AND WATER DURING FALLOW IN EASTERN WASHINGTON,
Agricultural Research Service, Pullman, Wash. Soil and Water Conservation Research Div.
R. I. Papendick, M. J. Lindstrom, and V. L. Cochran.
Soil Science Society of America Proceedings, Vol 37, No 2, p 307-314, March-April, 1973. 8 fig, 1 tab, 23 ref.

Descriptors: *Mulching, *Dry farming, *Wheat, Temperature, Thermal insulation, *Cultivation, Unsaturated flow, Evaporation, *Washington.

Depth of dry soil mulch affected summer soil temperatures and seed-bed water at the end of fallow in the dryland wheat region of eastern Washington. Increasing the depth of the tillage mulch from 6 to 11 cm reduced summertime seed zone drying sufficiently to benefit wheat emergence. Reduction of drying was greatest when the seed zone had good capillary continuity with the deeper soil layers. Drying depth and intensity was greater with a cloddy soil mulch than with a fine mulch. The seed zone water-conserving effect of a fine soil mulch was related to the lowered temperatures and temperature gradients across the seed zone associated with the increased mulch depth. The deeper soil mulch conserved seedbed water through increased resistance to water flow from

moist layers to the atmosphere, and through increased thermal insulation of the moist soil below the dry mulch. Surface-applied straw decreased seed-zone temperatures under the shallow mulch only. (Skogerboe-Colorado State)
W74-10333

COMPARATIVE YIELD AND FERTILIZER EFFICIENCY OF NO-TILLAGE AND CONVENTIONALLY TILLED CORN,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
W. W. Moschler, G. M. Shear, D. C. Martens, G. D. Jones, and R. R. Wilmouth.
Agronomy Journal, Vol 64, No 2, p 229-231, March-April, 1972. 3 tab, 13 ref.

Descriptors: *Cultivation, *Corn(Field), Fertilization, *Fertilizers, Leaching, Nitrogen, Phosphorus, Potassium, Efficiencies, *Crop production.

Surface application of fertilizer for no-tillage corn is the most convenient method. The relative efficiency of fertilizer applied in this manner has been undetermined, however. Field experiments on three soil type in Virginia suggest that fertilizer efficiency for no-tillage corn with surface application was higher than for conventionally tilled corn with an equal disked-in application. No-tillage resulted in a 9-year average yield increase of 25.6% on Lodi salt loam, a 6-year average increase of 13.7% on Davidson clay loam, and a 5-year average increase of 39.0% on Cecil clay loam. In addition to increased yields, larger amounts of residual N, P, and K, as well as organic matter, were found in no-tillage soil in several cases. (Skogerboe-Colorado State)
W74-10335

RESPONSE OF CORN TO TIME AND RATE OF PHOSPHORUS AND ZINC APPLICATION,
West Virginia Univ., Morgantown. Div. of Plant Sciences.
R. F. Keefer, R. N. Singh, D. J. Horvath, and P. R. Henderlong.
Soil Science Society of America Proceedings, Vol 36, No 4, p 628-632, July-August, 1972. 5 fig, 8 tab, 23 ref.

Descriptors: *Nutrients, *Corn(Field), *Crop response, *Phosphorus, *Zinc, Soil chemistry, Fertility, *Fertilization, Fertilizers.

Corn was grown in the greenhouse on two soils--Monongahela, a Typic Fragiudult (I) and Wharton, an Aquic Hapludult (II), which differed in available Zn, available P, exchangeable Mg, total Zn, and organiz matter (OM). Dry matter yield and Zn concentration and content of plant parts were increased where Zn either as ZnSO4 or ZnEDTA was applied with P regardless of time to soil I. Zinc-EDTA seemed to be a better source of Zn since it increased Zn concentration in leaves and stems more than ZnSO4 on soil I. However, with soil II, response to ZnSO4 application was obtained only when P was applied at high rates 8 weeks before planting. Application of ZnEDTA produced no significant response by corn on soil II, probably due to instability of ZnEDTA under acid conditions resulting in appreciable amounts going fixed on clays in this soil. The relative response to Zn with increasing levels of P was greater on soil I than on soil II. Addition of Zn in the former decreased the percent P and P content in both leaves and stems at high levels of P application, however, application of Zn to all the latter did not show any noticeable affect on percent P at all levels of P application. (Skogerboe-Colorado State)
W74-10337

RESPONSE OF IRRIGATED CORN TO TIME, RATE, AND SOURCE OF APPLIED N ON SANDY SOILS,
Wisconsin Univ., Madison. Dept. of Agronomy.
P. E. Jung, Jr., L. A. Peterson, and L. E. Schrader.
Agronomy Journal, Vol 64, No 5, p 668-679, September-October, 1972. 6 tab, 6 ref.

Descriptors: *Fertilization, *Nitrogen, *Crop response, *Corn(Field), Nutrient removal, Nitrogen compounds, Fertility, *Sands, Soils, *Wisconsin.

Three sources of N were applied to corn at four rates and six times of application in all combinations. 'Wisconsin 273' and 'Wisconsin 433' corn were grown. Response was measured as grain yield, tissue yield, percentage N in tissue, percentage N in grain, and N uptake. The N applied during either the 5th, 6th, 7th, or 8th week after planting was the most effective as shown by increased grain and tissue yields. Nitrogen applied after the 8th week was associated with a distinct reduction in N uptake and grain and tissue yields. Generally, percentage N in the grain and tissue increased with later N applications. Nitrate reductase (NR) activity in the leaves and percentage N in grain and tissue increased with increasing rate of applied N. Yields of grain and tissue for Wisconsin 273 and Wisconsin 433 leveled off at the 112 and 168 kg/ha rates of N, respectively. (Skogerboe-Colorado State)
W74-10338

RELATION BETWEEN EVAPOTRANSPIRATION RATE AND MAIZE YIELD,
Hebrew Univ., Rehovoth (Israel). Dept. of Agriculture.
For primary bibliographic entry see Field 2D.
W74-10339

SENSITIVITY OF SOUTHERN PEAS TO PLANT WATER DEFICIT AT THREE GROWTH STAGES,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
E. A. Hiler, C. H. M. van Bavel, M. M. Hossain, and W. R. Jordan.
Agronomy Journal, Vol 64, No 1, p 60-64, January-February, 1972. 8 fig, 2 tab, 12 ref.

Descriptors: *Moisture stress, *Peas, *Soil moisture, Water utilization, Efficiencies, Leaves, *Moisture deficit.

Response of southern peas to different levels of water deficit at three different stages of growth was measured in a greenhouse. In each stage, plants were stressed to three levels of leaf water potential: -14 bars, -21 bars, and -28 bars. Crop susceptibility factors were determined for each stage of growth and level of plant water deficit. The flowering period was found to be the most sensitive stage, regardless of deficit level. The pod development stage was found to be least sensitive to level of deficit. A water deficit of -28 bars, however, caused a yield reduction of greater than 50% for all growth stages. Stress-day index values were calculated and related to crop yield. The use of the stress-day index concept in irrigation scheduling is discussed. (Skogerboe-Colorado State)
W74-10340

COMBINING EXPERIMENTS TO PREDICT FUTURE YIELD DATA,
Cornell Univ., Ithaca, N.Y.
F. B. Cady, and D. M. Allen.
Agronomy Journal, Vol 64, No 2, p 211-214, March-April, 1972. 3 fig, 2 tab, 6 ref.

Descriptors: *Regression analysis, *Yield equations, Soil tests, *Fertility, Fertilization, *Crop production.

Data from a series of fertility experiments including uncontrolled environmental variables are analyzed so that future yields may be predicted. A new criterion, the prediction sum of squares, based on the performance of the estimated equation for predicting observations not included in the least squares estimation, is developed for selecting the best predictor variables. The procedure gives an estimated prediction equation with a minimal number of predictor variables, including few interaction variables. Agronomically reasonable estimates of the regression coefficients also are obtained. Using the new procedure, a 30% reduction in the sum of squared deviations between the observed and the predicted observations compared with the stepwise regression method is found. Response curves are constructed for use in making soil test recommendations. (Skogerboe-Colorado State)
W74-10344

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

EVALUATION AND IMPLEMENTATION OF URBAN DRAINAGE AND FLOOD CONTROL PROJECTS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 6B.
W74-09802

APPLICATION OF THE LUNR INVENTORY SYSTEM FOR WATER RESOURCES PLANNING AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN,
Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
For primary bibliographic entry see Field 6B.
W74-09807

ECONOMIC ANALYSIS OF WATER SUPPLY NEEDS AND ALTERNATIVES IN A MULTI-COUNTY INDUSTRIAL AREA,
Clemson Univ., Dept. of Agricultural Economics and Rural Sociology.
For primary bibliographic entry see Field 6D.
W74-09808

ARID ZONE IRRIGATION,
For primary bibliographic entry see Field 3F.
W74-09815

DRAINAGE AND WATER MANAGEMENT IN HUNGARY,
Agricultural Research Service, Riverside, Calif.
For primary bibliographic entry see Field 2G.
W74-09816

DEVELOPMENT OF BI-LEVEL DRAINAGE THEORY,
South Dakota State Univ., Brookings.
D. W. DeBoer, and S. T. Chu.
Paper No 72-731 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972 Chicago, Illinois. 12 p, 4 fig, 6 ref.

Descriptors: *Drainage, *Surface drainage, *Subsurface drainage, *Tile drainage, Crop response, Soil water, Drainage engineering, Soil water movement.
Identifiers: *Bi-level drainage.

Two analytical solutions were derived for the bi-level drainage problem. The two solutions, based on the Dupuit-Forchheimer assumptions, are for the steady state and falling water table conditions. These solutions should be applicable to the design of subsurface drainage systems with drain lines at

two elevations on an alternating basis. (Skogerboe-Colorado State)
W74-09817

DO I REALLY NEED TO IRRIGATE TODAY, PART 1,
For primary bibliographic entry see Field 3F.
W74-09818

SPRINKLIGATION AS SEEN AND DONE BY THE OPERATOR...THE MAN AND THE QUALITY OF THIS LABOR DETERMINES THE SUCCESS OF THE SPRINKLER IRRIGATION OPERATION,
For primary bibliographic entry see Field 3F.
W74-09820

IRRIGATION, DRAINAGE AND SALINITY.
For primary bibliographic entry see Field 3C.
W74-09821

DRIP IRRIGATION DEVELOPER IN ISRAEL MAKES DEAL TO MARKET SYSTEM IN U.S.
For primary bibliographic entry see Field 3F.
W74-09822

NUMERICAL EXPERIMENT FOR SOLVING COMPLETE EQUATIONS OF HYDRODYNAMICS,
For primary bibliographic entry see Field 2B.
W74-09898

REGIONAL FLOOD MAPPING FROM SPACE,
National Aeronautics and Space Administration, Greenbelt, Md.
For primary bibliographic entry see Field 7C.
W74-09906

EXPECTED RANGE AND ADJUSTED RANGE OF HYDROLOGIC SEQUENCES,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
J. D. Salas-La Cruz, and D. C. Boes.
Water Resources Research, Vol 10, No 3, p 457-463, June 1974. 7 fig, 15 ref. NSF Grant GK-11564.

Descriptors: *Stochastic processes, *Streamflow forecasting, *Reservoir yield, Water storage, Statistics, Statistical methods, Reservoir storage, Water management(Applied).

Because of the stochastic nature of hydrologic sequences such as streamflow the needed capacity of a reservoir is a random variable. Studies of storage capacity of reservoirs, under the assumption of infinite storage, lead to the problem of finding the distribution of the range or adjusted range of partial sums. Both the expected range and the expected adjusted range can be obtained from a single formula by changing an appropriate parameter. A general formula is given for the expected range and expected adjusted range for any set of exchangeable random variables and for any degree of development. (Knapp-USGS)
W74-09908

EFFECT OF SKEWNESS IN THREE STOCHASTIC PENTAD RIVER FLOW MODELS ON CROSSING PROPERTIES OF SYNTHESIZED DATA,
Birmingham Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W74-09909

SURFACE WATER NETWORK DESIGN BY REGRESSION ANALYSIS SIMULATION,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 2E.
W74-09912

FLOODS FROM SMALL DRAINAGE AREAS IN CALIFORNIA--A COMPILATION OF PEAK DATA, OCTOBER 1958 TO SEPTEMBER 1973,
Geological Survey, Menlo Park, Calif.
A. O. Waananen.
Geological Survey Data Report, December 12, 1973. 261 p, 67 fig, 4 tab.

Descriptors: *Floods, *Small watersheds, *California, *Hydrographs, *Data collections, Hydrologic data, Flood frequency, Peak discharge, Storm runoff, Basic data collections.

Annual peak discharges at 332 sites on small drainage areas in California, and flood hydrographs and precipitation data at 66 sites were obtained during the period October 1958 to September 1973. These basic data were obtained for use in a study of flood frequency for small streams. A summary of storm precipitation and the related volumes of runoff, as represented by the flood hydrographs, is included. (Knapp-USGS)
W74-09940

HYDROGRAPHY OF THE CHESAPEAKE AND DELAWARE CANAL,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
D. W. Pritchard, and G. B. Gardner.
Chesapeak Bay Institute Technical Report 85, Johns Hopkins University (Reference 74-1), February 1974. 171 p, 5 fig, 13 tab, 1 append.

Descriptors: *Canals, *Water quality, *Water circulation, Estuaries, *Salinity, Open channel flow, Dredging, Streamflow, Chesapeake Bay, Delaware River.
Identifiers: *Chesapeake and Delaware Canal.

Temperature, salinity, and water velocity were measured in the Chesapeake and Delaware Canal between May 1969 and February 1973 to determine the effect of the enlargement of the Canal on the transport of water and on the salinity distribution in the Canal and adjacent areas of the Chesapeake Bay and Delaware River. Conditions in the Canal are usually marked by large, short-term fluctuations. The best estimate for the long-term average transport is 988 cfs before enlargement, and 2,450 cfs after enlargement, both toward the Delaware. The salinity generally increases from west to east through the Canal. The values range from essentially fresh in the western end during the period of high flow from the Susquehanna, to about 0.8% in the eastern portion during low flow conditions. (Knapp-USGS)
W74-09944

HYDROLOGIC DATA OF THE NEPONSET AND WEYMOUTH RIVER BASINS, MASSACHUSETTS,
Geological Survey, Boston, Mass.
R. A. Brackley, W. B. Fleck, and R. E. Willey.
Geological Survey open-file report, 1973. 51 p, 1 fig, 1 plate, 6 tab, 12 ref.

Descriptors: *Basic data collections, *Massachusetts, *Groundwater, *Surface waters, *Hydrologic data, Data collections, Water quality, Discharge(Water), Water wells.
Identifiers: Neponset River(Mass), Weymouth River(Mass).

Hydrologic data were collected in the Neponset, Weymouth Fore, and Weymouth Back River basins in eastern Massachusetts south of Boston. Water resources were studied in the areas of these basins that are upstream from tide effect or heavy urbanization. In addition to streamflow, geologic, groundwater, and chemical water-quality data obtained in the field, information on many wells and borings was supplied by municipal and state agencies. The data include streamflow, drillers' logs, water analyses, and well yields. (Knapp-USGS)
W74-09945

NETWORK FLOW MODELING OF MULTIRESERVOIR DISTRIBUTION SYSTEMS,
Texas Univ., Austin. Center for Research in Water Resources.
G. Bhaumik, W. Driscoll, and P. Jensen.
Available from the National Technical Information Service as PB-233 927 $5.50 in paper copy, $1.45 in microfiche. Technical Report No CRWR-107, June 1974, 151 p, 31 fig, 7 tab, 85 ref, 2 append. OWRR B-107-TEX (1) 14-31-0001-3656.
Identifiers: *Networks, Flow, *Model studies, Reservoirs, *Distribution, Optimization, Evaporation, Economics, *Algorithms, *Water loss, Risks, Water supply, *Optimum development plans, *Multiple-purpose reservoirs, *Reservoir operation.

The operating policy for a multireservoir distribution system is determined by many factors including benefits and priorities for the current use of water, size and use limitations of the facilities of the system, costs and delays in transmitting water through the system, and the current and future weather. Some of these factors have been modeled using a network flow model which allows determination of optimum policies for complex systems. This report describes three extensions to the current modeling capabilities. The first part discusses the water losses which occur in the system and proposes a computerized algorithm which can solve networks with losses. The second part treats the same problem but derives a much more efficient algorithm. The third part considers the uncertainty inherent in estimates of future water supplies and demands and provides a representation for this uncertainty for the network model. The general approach is to calculate a mathematical expression which determines the value of water stored for the future. This work expands the generality of the network flow models as related to water systems and also makes contributions to the general theory of network flow analysis.
W74-09952

HUDSON RIVER,
For primary bibliographic entry see Field 5C.
W74-09958

THE LOWER MISSISSIPPI,
For primary bibliographic entry see Field 5C.
W74-09959

SAVANNAH RIVER,
For primary bibliographic entry see Field 5C.
W74-09960

FLOOD PLAIN INFORMATION, OHIO RIVER: MONROE COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Monroe County Planning Commission and the State of Ohio Department of Natural Resources, December, 1971. 31 p, 8 fig, 13 plates, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohio River, *Flood profiles, *Flood protection, Locks, Dams, Flood frequency, Rivers, Tributaries, Gages, Gaging, Flood forecasting, Flow, Obstructions to flow.
Identifiers: Monroe County(Ohio), Intermediate Regional Flood.

Switzerland, Salem, Ohio, Lee, and Jackson townships and the Village of Clarington are the major population centers of Monroe County, located on the right or west bank of the Ohio River from Mile 110.85 to Mile 140.50 downstream of Pittsburgh, Pa. A moderately wide floodplain and the relatively low river gradient of the Ohio River result in prolonged critical flooding. No tributaries in Monroe County have a significant effect on flood stages. Gage records have been kept for varying periods since 1911. The main flood season

is usually December through April. Duration of flooding is relatively long. The major obstructions to flood flows are Locks and Dam 14, 15, and 16 soon to be replaced by the Hannibal Locks and Dam and the Willow Island Locks and Dam, both with gates structures permitting underpassage of flow. Fourteen upstream flood control projects are effective in reducing flood levels 5 to 9 feet. The most serious floods took place on March 19, 1936 from Mile 110.8 to 115.0 and on March 28, 1913 from Mile 115.0 to Mile 140.5. Both floods occurred after abnormally heavy rainfalls and damage was heavy, with water covering major portions of Clarington, Hannibal, Duffy and Fly. The most recent major flood, March 11, 1964, crested 6.9 feet above the gage reading of 41 feet which defines a major flood on the Ohio River. Based on previous gage records, a projected Intermediate Regional Flood (detailed on plates) would have a peak discharge of 390,000 cu. ft./sec. and a reach elevation of 637.0 m.s.l. at Hannibal Locks and Dam upper gage. Flood areas delineating the Intermediate Regional Flood, the 1913 flood and normal pool are shown on topographic maps. (LaPointe-North Carolina)
W74-09965

FLOOD PLAIN INFORMATION, OHIO RIVER: JEFFERSON COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Jefferson County Planning Commission and The State of Ohio Department of Natural Resources, December, 1971. 33 p, 9 fig, 15 plates, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohio River, *Flood profiles, *Flood protection, Locks, Dams, Flood frequency, Rivers, Tributaries, Gages, Gaging, Flood forecasting, Flow, Obstructions to flow.
Identifiers: Jefferson County(Ohio), Intermediate Regional Flood, Steubenville(Ohio), Pike Island Lock and Dam, New Cumberland Lock and Dam.

Empire, Toronto, Steubenville, Mingo Junction, Brilliant, Rayland, Tiltonsville and Yorkville are the major cities of Jefferson County, located on the right or west bank of the Ohio River from Mile 49.8 to Mile 83.7 downstream of Pittsburgh, Pa. Above Jefferson County the Ohio River has a moderately wide floodplain and a relatively flat river gradient. In the Jefferson County reach the valley floor varies in width from 0.4 mile to 0.7 mile and there are no tributaries that have a significant effect on flood stages. The main flood season is usually December through April and duration of flooding is relatively long. Pike Island Locks and Dam and New Cumberland Locks and Dam control flood flows in the report reach. Fourteen upstream flood control projects are effective in reducing flood levels from 6 to 9 feet. The most serious recorded flood occurred on March 19, 1936 after 2 days of heavy rains (1-6 inches), with Steubenville and Yorkville about 40% covered by water while Stratton, Empire, Mingo Junction, Brilliant, Rayland and Tiltonsville were almost completely covered. Damage was estimated in the millions of dollars. A flood of lesser gravity took place on December 31, 1942. Damage was estimated in the millions. Stratton, Empire, Brilliant and Rayland suffered the heaviest damage. The most recent major flood, on March 11, 1964, crested at 5.9 feet above major flood stage at New Cumberland. A projected Intermediate Regional Flood (IRF) based on previous gage records would have a peak discharge of 405,000 cubic feet per second and would reach an elevation of 680.3 m.s.l. at New Cumberland Locks and Dam Upper Gage as detailed in topographic maps. (LaPointe-North Carolina)
W74-09966

FLOOD PLAIN INFORMATION, MONONGAHELA RIVER: NORTH CHARLEROI, CHARLEROI, SPEERS, DUNLEVY, ALLENPORT, STOCKDALE, ROSCOE, AND ELCO, WASHINGTON COUNTY, PENNSYLVANIA.
Army Engineer District, Pittsburgh, Pa.
Prepared for Communities along the Monongahela River from North Charleroi to Elco and The Washington County Planning Commission, March, 1970. 43 p, 7 fig, 27 plates, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, Floods, *Flood profile, *Flood protection, Flood frequency, Tributaries, Gages, Flood forecasting, Flow, Obstructions to flow, *Pennsylvania.
Identifiers: Washington County(Pa.), *Monongahela River(Pa.), Intermediate Regional Flood, Standard Project Flood, Tygart Dam(W. Va.).

Intended to provide a basis for future study and planning, a record is presented of the largest known floods on the Monongahela between North Charleroi and Elco, and probable future floods are discussed. Solution of flood problems is not included. Located on comparatively high ground, most residential sections have escaped serious damage, although some business and industrial sections in low lying areas have been flooded. The Monongahela River watershed above North Charleroi consists of relatively narrow valleys with steep hillside slopes conducive to rapid initial runoff. In the 9.2 mile reach studied, the river valley is 0.5 miles wide with the river slope 0.8 ft./mi. with no significant tributaries. Gage records have been maintained since 1885. The only major obstruction of flood flows is Locks and Dam 4, a gated structure allowing almost unimpeded flow when the gates are wide open. Operations of Tygart Dam and Reservoir near Grafton, West Virginia, upstream of Washington County, has reduced flood peaks an average of 4 feet. Two flood control dams are authorized for construction, one at Rowlesburg, Va. on Cheat River, and one above Weston on West Fork River. Main flood season is usually December through April. Major floods occurred on March 18, 1936, March 7, 1967, and March 5, 1963, all resulting from heavy spring rainfall augmented by snowmelt,. Based on gage records, complete flood profiles were compiled for hypothetical Intermediate Regional and Standard Project Floods. (LaPointe-North Carolina)
W74-09967

FLOOD PLAIN INFORMATION, OHIO RIVER: BELMONT COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Belmont County Planning Commission and The State of Ohio Department of Natural Resources, June 1971. 31 p, 10 fig, 12 plates, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohio River, *Flood profiles, *Flood protection, Locks, Dams, Flood frequency, Flood forecasting, Obstructions to flow.
Identifiers: Belmont County(Ohio), Intermediate Regional Flood.

Martins Ferry, Bridgeport, Bellaire, Shadyside, and Powhatan Point, all having concentrated residential and industrial development on the flood plain, are the major towns in Belmont County, Ohio, which is situated on the west bank of the Ohio River from Mile 83.7 to Mile 110.9 downstream of Pittsburgh, Pa. Above Belmont County, the Ohio River has a moderately wide flood plain and a relatively flat river gradient (0.6 ft./mi. in the report reach). In the Belmont County reach there are no tributaries that have a significant effect on flood stages. Main flood season is December through April with flood duration for relatively long periods. Major obstructions to flood flows are Pike Island Locks and Dam, equipped with gates allowing underpassage of flow, and Locks and Dams 12, 13, and 14, which will soon be replaced by Hannibal Locks and Dam, a similarly gated structure. Thirteen upstream flood control projects operated by the Corps of Engineers are effective in reducing flood levels in Belmont County from 6 to 9 feet. The most serious recorded flood for this area occurred on March 19, 1936. Two days of heavy rains created damage estimated in the millions of dollars. A flood of lesser gravity took place on Dec. 31, 1942. The most recent major flood occurred on March 11, 1964. Using gage records for the past 108 years, the characteristics of an Intermediate Regional Flood were determined. It would have a peak discharge of 390,000 cubic feet per second and would be 1.7 flood feet above the 1964 flood at Hannibal Dam. No plans for the solution of flood problems are provided. (LaPointe-North Carolina)
W74-09968

FLOOD PLAIN INFORMATION, OHIO RIVER: WETZEL COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Wetzel County Planning Commission, and The State of West Virginia Department of Natural Resources, December, 1971. 27 p, 8 fig, 7 plates, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohio River, *Flood profile, *Flood protection, Locks, Dams, Flood frequency, Rivers, Tributaries, Gages, Gaging, Flood forecasting, Flow, Obstructions to flow.
Identifiers: Wetzel County(W.Va.), Intermediate Regional Flood.

New Martinsville is the major town of Wetzel County, a sparsely settled region of West Virginia. The county is situated on the left or east bank of the Ohio River from Mile 121.6 to Mile 133.6 downstream of Pittsburgh, Pennsylvania. Above Wetzel County the Ohio River has a moderately wide floodplain and a relatively flat river gradient (a slope of 0.5 ft./mi. in the report reach). In Wetzel County there are no tributaries that have a significant effect on flood stages. The main flood season is usually December through April and duration of flooding is relatively long. The major obstructions to flow are Locks and Dams 15 and 16 which have no control over flood flows. These will be soon replaced by Hannibal Locks and Dam (Mile 126.4) and Willow Island Locks and Dam (Mile 161.7), both of which will be equipped with gates to allow underpassage of flow. Fourteen upstream flood control projects are effective in reducing flood levels in Wetzel County from 5 to 9 feet. The most serious recorded flood for this area occurred on March 28, 1913 after 3 days of heavy rains, creating severe damage. The worst recent major flood occurred March 11, 1964, when flood crest registered 10.2 feet below the 1913 reading at Lock and Dam 15. Based on 60 years of gage records, the characteristics of an Intermediate Regional Flood were projected and shown on topographic maps. It would have a peak discharge of 389,000 cubic ft./sec. and would reach an elevation of 635.5 ft. at Lock and Dam (1.5 ft. above 1964 crest). Plans for solution of flood problems are not included. (LaPointe-North Carolina)
W74-09969

FLOOD PLAIN INFORMATION, OHIO RIVER: MARSHALL COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Marshall County Planning Commission and the State of West Virginia Department of Natural Resources, December, 1971. 32 p, 8 fig, 12 plates, 6 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohio River, *Flood profiles, *Flood protection, Locks, Dams, Flood frequency, Gages, Flood forecasting, Flow, Obstructions to flow, *West Virginia.
Identifiers: Marshall County(W.Va.), Intermediate Regional Flood(IRF).

Marshall County is situated on the east bank of the Ohio River from Mile 92.9 to Mile 121.6 downstream of Pittsburgh, Pa. Benwood, McMechen, Glendale and Moundsville, all heavily in-

dustrialized, are the major towns. Above Marshall County, the Ohio River has a moderately wide flood plain and a relatively flat river gradient (a slope of 0.5 ft./mi. for the report reach). No tributaries in Marshall County have a significant effect on flood stages. The main flood season is usually December through April. Duration of flooding is relatively long. The major obstructions to flood flows are Locks and Dams 13, 14, and 15, which have no control over flows. These will be replaced by Hannibal Locks and Dam, equipped with gates allowing underpassage of flow. Thirteen upstream flood control projects are effective in reducing flood levels from 5 to 9 feet. No flood plain regulations or flood proofing building codes are in effect in Marshall County. Most serious recorded floods were the March 19, 1936 flood from Mile 92.9 to Mile 115.0, and the March 28, 1913 flood from Miles 115.0 to 121.6. Damage was estimated in the thousands of dollars. The most recent major flood, with a gage reading of 47.9 at Lock and Dam 14 occurred on March 11, 1964. Using gage records for the past 60 years, the characteristics of an Intermediate Regional Flood were determined with an estimated peak discharge of 389,000 cubic feet per second and an elevation of 637.0 m.s.l. at Hannibal Locks and Dam Upper Gage. Topographic maps illustrate the projected flood profile. No plans for solution of flood problems are provided. (LaPointe-North Carolina)
W74-09970

FLOOD PLAIN INFORMATION, OHIO RIVER: HANCOCK COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Hancock County Planning Commission and the State of West Virginia Department of Natural Resources, December, 1971. 27 p, 6 fig, 12 plates, 5 tab, glossary.

Descriptors: *Flood plains, *Flood control, *Ohio River, *West Virginia, *Flood profiles, *Flood protection, Locks, Dams, Flood frequency, Rivers, Tributaries, Gages, Gaging, Flood forecasting, Flow, Obstruction to flow.
Identifiers: Hancock County(W.Va.), Intermediate Regional Flood(IRF), Pike Island Locks and Dam(W.Va.), New Cumberland Locks and Dam(W.Va.).

Chester, New Cumberland, and Weirton are the major cities of Hancock County, located on the left or east bank of the Ohio River from Mile 40.1 to Mile 64.7 downstream of Pittsburgh, Pa. The Ohio River falls 429 feet in its 981 mile course to the Mississippi River at Cairo, Ill. The Ohio River Basin, Pittsburgh has a 26,967 sq. mi. drainage area. Heavy winter snows and spring rains create the main flood season, December through April, with flooding for relatively long periods. New Cumberland and Pike Island Locks and Dam equipped with gates to allow unimpeded flows control approximately 25 miles of the Hancock County reach of the Ohio River. Fourteen upstream flood control projects are effective in reducing flood levels from 6 to 9 feet. The most serious recorded flood for this area occurred on March 19, 1936 after 2 days of heavy rains (1-6 inches), with damage estimated in the hundreds of thousands of dollars. A flood of lesser gravity took place on December 21, 1942, with heavy damage to homes and industry. The most recent major flood on March 11, 1964, crested at 5.9 feet above major flood stage as recorded at New Cumberland Locks and Dam. A projected Intermediate Regional Flood (IRF) based on previous gage records would have a peak discharge of 405,000 cubic feet per second and would reach an elevation of 680.3 m.s.l. at New Cumberland Locks and Dam Upper Gage. Damage is estimated at $2,000,000. A complete flood profile, indicating lands inundated by the March 1936 flood and areas which would be flooded by an IRF is shown on topographic maps. (LaPointe-North Carolina)
W74-09971

FLOOD PLAIN INFORMATION, OHIO RIVER: COLUMBIANA COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
Prepared for The Columbiana County Planning Commission and the State of Ohio Department of Natural Resources, December, 1971. 29 p, 5 fig, 7 plates, 5 tab.

Descriptors: *Flood plains, *Flood control, *Ohio River, *Flood profiles, *Flood protection, Ohio, Locks, Dams, Flood frequency, Rivers, Tributaries, Gages, Gaging, Flood forecasting, Flow, Obstruction to flow.
Identifiers: Columbiana County(Ohio), Intermediate Regional Flood.

East Liverpool and Wellsville, each having much development in the flood plain area, are the major cities of Columbiana County located on the right or west bank of the Ohio River from Mile 39.9 to 49.8 downstream of Pittsburgh, Pa. The Ohio River Valley varies in width from about 0.2 to 0.5 mile with an average slope for the River approximately 1 foot per mile in the study reach. Heavy winter snows and spring rains make the main flood season December through April and flood duration is for relatively long periods. New Cumberland Locks and Dam, equipped with gates to allow underpassage of flow when a flow of 200,000 cubic feet per second is reached, controls all of the Columbiana reach. Fourteen upstream flood control projects are effective in reducing flood levels in Columbiana County from 6 to 9 feet. The most serious recorded flood occurred on March 19, 1936 after 2 days of heavy rains (1-6 inches), and damage was estimated at one million dollars. A flood of lesser gravity took place on Dec. 31, 1942, with damage estimated to be many thousands of dollars. The most recent major flood, March 11, 1964, crested at 5.9 feet above major flood stage at New Cumberland Locks, and Dam. A projected Intermediate Regional Flood (IRF) based on previous gage records would have a peak discharge of 405,000 cubic feet per second and would reach an elevation of 680.3 m.s.l. at New Cumberland Locks and Dam Upper Gage. Maximum velocity in the main channel would be 10 ft. per sec. and in the overbank area 3 ft. per sec. Damage would be in excess of $2,000,000. A complete flood profile, indicating lands inundated by the 1936 flood areas which would be flooded by an IRF is shown on topographic maps. (LaPointe-North Carolina)
W74-09972

FLOODING PROBLEMS ASSOCIATED WITH CURRENT HIGH LEVELS OF THE GREAT LAKES.
Michigan Dept. of Natural Resources, Lansing. Water Development Services Div.
For primary bibliographic entry see Field 2H.
W74-09994

NOVEMBER 1972 FLOODS ON THE LOWER GREAT LAKES,
Windsor Univ., (Ontario). Dept. of Geography.
For primary bibliographic entry see Field 2H.
W74-10050

A CASE STUDY IN INTERSTATE RESOURCE MANAGEMENT: THE CALIFORNIA-NEVADA WATER CONTROVERSY, 1955-1968,
California Univ., Davis. Dept. of History.
For primary bibliographic entry see Field 6E.
W74-10083

VARIATION OF REGIME COEFFICIENTS IN PAKISTAN CANALS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W74-10219

RELATION OF SEASONAL DISTRIBUTION OF RUNOFF TO FLUCTUATIONS IN ANNUAL DISCHARGE (OBUSLOVLENNOST' VNUTRIGODOVOGO RASPREDELENIYA STOKA KOLEBANIYAMI VODNOSTI GODA),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 2E.
W74-10222

POSSIBLE EFFECT OF CHANGES IN HYDROGEOLOGIC CONDITIONS OF THE PITSUNDA PENINSULA ON PITSUNDA PINE TREES (O VOZMOZHNOSTI VLIYANIYA IZMENENIY GIDROGEOLOGICHESKIKH USLOVIY P-OVA PITSUNDA NA PITSUNDSKUYU SOSNOVUYU ROSHCHU),
For primary bibliographic entry see Field 3C.
W74-10224

PROBLEMS OF RELIABILITY OF WATER-SUPPLY SYSTEMS (O PROBLEMAKH NADEZHNOSTI SISTEM VODOSNABZHENIYA),
Moskovski Inzhenerno-Stroitelnyi Institut (USSR).
N. N. Abramov.
Vodnyye Resursy, No 2, p 114-119, 1974.

Descriptors: *Conferences, *Water supply, *Reliability, Quality control, Standards, Design, Accidents, Damages.
Identifiers: *USSR.

The First All-Union Scientific and Technical Conference on Reliability of Water Supply Systems was held at the Moscow Construction Engineering Institute, October 24-26, 1973. The conference was attended by representatives of 110 organizations, including 31 universities, 14 scientific research institutes, 33 planning and design agencies, 18 industrial organizations, and 14 representatives of ministries and departments. A total of 22 papers were presented. Proposals introduced at the conference were concerned with further development of the theory and methods of computation and implementation of measures to insure the reliability of water-supply systems. (Josefson-USGS)
W74-10225

TEMPERATURE REGIME OF DEEP WATER BODIES DURING SPRING AND SUMMER HEATING (TEMPERATURNYY REZHIM GLUBOKIKH VODOYEMOV V PERIOD VESENNE-LETNEGO NAGREVA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 2H.
W74-10226

RELATION OF FLUCTUATIONS IN LEVELS OF THE CASPIAN AND ARAL SEAS (O SVYAZI KOLEBANIY UROVNEY KASPIYSKOGO I ARAL'SKOGO MOREY),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 2H.
W74-10229

WATER RESOURCES OF THE KOMI ASSR AND PROSPECTS OF THEIR USE (VODNYYE RESURSY KOMI ASSR I PERSPECKTIVY IKH ISPOL'ZOVANIYA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
N. N. Vetoshkina, G. A. Yestaf'yev, R. G. Dzhamalov, I. S. Zektser, and G. P. Kalinin.
Vodnyye Resursy, No 2, p 3-16, 1974. 8 fig, 3 tab, 10 ref.

Descriptors: *Water resources, *Water utilization, *Water supply, *Water balance, Inflow, Discharge(Water), Precipitation(Atmospheric), Evaporation, Runoff, Surface waters, Surface-

groundwater relationships, Groundwater resources, River basins, Maps, Equations.
Identifiers: USSR(Komi ASSR), Isolines.

The Komi ASSR, which covers 416,800 sq km, is predominantly a gently undulating plain with elevations ranging from 100 to 300 m. Annual precipitation over most of the territory is about 650 mm. Evaporation in the Republic increases from 300 mm in the north to 470 mm in the south. Runoff volumes of the Pechora and Vychegda Rivers are about 120 cu km/yr and 32 cu km/yr, respectively. Total surface-water resources of the Republic are 176.4 cu km, of which 13.4 cu km (8%) are derived from the Nenets National District. Outflow from the Republic into the Nenets National District is 72% of total runoff. Total drained fresh groundwater resources (area 411,000 sq km) are 35 cu km/yr, of which 24 cu km are concentrated in the Pechora Basin, 8 cu km in the Vychegda Basin, and 3 cu km in the Mezen' Basin. Groundwater yield (area 386,000 sq km) is 660 cu m/sec or 21 cu km/yr. Water availability per sq km of area is about 430,000 cu m/yr or approximately twice that for the USSR on the whole. Per capita availability of water in the Republic is 185,000 cu m/yr, while that for the USSR is only about 20,000 cu m/yr. Total volume of water consumed by all branches of the national economy in the Republic in 1970 was 1,620,000 cu m/day or 0.59 cu km/yr, of which about 91% was for industrial use and 9% for public and domestic use. Qualitative and quantitative estimates of water use were examined without regard for the possible diversion of part of the runoff of Komi rivers (about 37 cu km/yr) into the Volga Basin. (Josefson-USGS)
W74-10230

GUIDELINES FOR THE DESIGN OF SUBSURFACE DRAINAGE SYSTEMS FOR HIGHWAY STRUCTURAL SECTIONS,
Cedergren/KOA, Sacramento, Calif.
For primary bibliographic entry see Field 4C.
W74-10235

SOME PATTERNS OF VARIATIONS IN AVERAGE MONTHLY RIVER AND GROUNDWATER LEVELS IN THE PRIPYAT' POLES'YE REGION (NEKOTORYYE ZAKONOMERNOSTI IZMENENIYA SREDNEMESYACHNYKH UROVNEY REK I PODZEMNYKH VOD NA TERRITORII PRIPYATSKOGO POLES'YA),
G. I. Sachok, and M. V. Fadeyeva.
Akademiya Nauk BSSR Doklady, Vol 17, No 2, p 175-178, February 1973. 1 fig, 3 tab, 1 ref.

Descriptors: *Water levels, Rivers, *Groundwater, Average, *Monthly, Annual, Seasonal, Variability, Statistical methods, Correlation analysis, Probability, *Forecasting, Gaging stations, Succession.
Identifiers: *USSR(Belorussia), *Pripyat' River(USSR), *Poles'ye Region(USSR).

The general character of variability of river and groundwater levels in different parts in the Poles'ye Region in southeastern Belorussia is very similar and represents a quite clear, regular succession of stages complicated by characteristics of a specific year and of specific hydrogeological conditions. A new method is used for graphic representation of long-term series of average monthly levels in the form of probability fields. On the basis of application of this and other statistical methods, attention is focused on the possibility of improving forecasts of average monthly river and groundwater levels. (Josefson-USGS)
W74-10263

WATER RESOURCES DATA FOR TEXAS, 1973: PART 1. SURFACE-WATER RECORDS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 7C.
W74-10268

A METHODOLOGY FOR PLANNING LAND USE AND ENGINEERING ALTERNATIVES FOR FLOODPLAIN MANAGEMENT,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
R. N. Weisz.
Available from Univ. Microfilms, 300 No Zeeb Rd, Ann Arbor, Mich, 48106 (Order No 74-2013). PhD Dissertation, 1973. 286 p.

Descriptors: *Mathematical models, *Land use, *Flood plains, Land management, Floodproofing, Costs, Channels, Dams, Engineering structures, Distribution, *Methodology, *Decision making, Flood protection, Planning, Management, *Alternative planning.
Identifiers: *Floodplain management, Land distribution.

Analytical and decision-making methodology is developed in terms of planning land use and regulations, development policies, and engineering measures. The objective of the floodplain management system is to select the most economically efficient combination of land use and engineering alternatives. A test application and computer study makes decision rules for combining: spatial and temporal distribution of urban land uses; site elevation through dirt fill; floodproofing; public acquisition of undeveloped land for open space uses; public acquisition and removal of existing improvements from the floodplain; dams; and channel improvement. The methodology can be used to formulate floodplain management system plans, to evaluate the economic impact of floodplain management system plans, to perform 'with and without' analyses, and to perform incremental analyses of development policy and engineering alternatives. (Prague-FIRL)
W74-10277

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA (LOS PROGRAMAS DE ABASTECIMIENTO RURAL DE AQUA DE AMERICA LATINA),
For primary bibliographic entry see Field 6E.
W74-10279

A MATHEMATICAL MODEL FOR THE ANALYSIS OF RIVER DIVERSIONS,
Hydraulics Reasearch Station, Wallingford(England).
For primary bibliographic entry see Field 8B.
W74-10320

WATER-DISTRIBUTION RESEARCH AND APPLIED DEVELOPMENT NEEDS.
American Water Works Association, New York. Research Committee on Distribution Systems.
Journal of the American Water Works Association Vol 66, No 6, p 385-390, June 1974. 45 ref.

Descriptors: *Water distribution(Applied), *Research, *Water resources development, Planning, Design, Operation and maintenance, Simulation analysis, Potable water, Operating costs, Networks, Systems analysis.
Identifiers: Cost-effectiveness.

Reported is the work of a special AWWA committee, charged with evaluation of research and applied development needs in the technical planning, design, and operation of water distribution systems. A water distribution system is defined as including all water utility components for distribution of finished or potable water by means of gravity storage feed or pumps through distribution piping networks to customers or other users, including distribution-equalizing storage. Attention centers on subject matter containing significant potential transferability of findings to most water utilities. Basic planning procedures are outlined and priorities are identified. System simulation is discussed, and the basic objectives in automatic operational control are defined as maximization of service and minimization of operating costs. Discussed is the computational objective of network analysis--to define the piezometric surface of the network; a near solution can be determined using iterative, successive approximation techniques. Discussed also are the: status of developments; demand characteristics; analysis requirements; and additional needs and amplifications. Needed are an expectation of high cost-effectiveness and a good potential for wide transferability of results. (Bell-Cornell)
W74-10323

4B. Groundwater Management

THE TRANSMISSIVITY ITERATIVE PROGRAMS ON THE PDP-9 COMPUTER - A MAN-MACHINE INTERACTIVE SYSTEM,
Battelle-Pacific Northwest Labs., Richland, Wash. Mathematics Dept.
For primary bibliographic entry see Field 2F.
W74-09825

PRELIMINARY EVALUATION OF METHODS FOR THE DISPOSAL OF TRITIATED WATER FROM NUCLEARLY STIMULATED NATURAL GAS WELLS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5C.
W74-09837

SAVANNAH RIVER LABORATORY PROGRESS REPORT-LONG-RANGE WASTE MANAGEMENT.
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 5E.
W74-09881

MODELING FLOW AND CHEMICAL QUALITY CHANGES IN AN IRRIGATED STREAM-AQUIFER SYSTEM,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 5B.
W74-09883

MATHEMATICAL SIMULATION OF THE SUBSIDENCE OF VENICE 2. RESULTS,
Centro di Ricerca IBM di Venezia (Italy).
For primary bibliographic entry see Field 2F.
W74-09884

SURVEY OF REMOTE SENSING APPLICATIONS,
Geological Survey, Reston, Va. Eros Program Office.
For primary bibliographic entry see Field 7B.
W74-09899

SENSITIVITY ANALYSIS OF INPUT PARAMETERS IN NUMERICAL MODELING OF STEADY STATE REGIONAL GROUNDWATER FLOW,
Geulph Univ., (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 2F.
W74-09900

GROUND WATER POLLUTION FROM SUBSURFACE EXCAVATIONS: PART IV. MORE ON POLLUTION FROM WELLS.
For primary bibliographic entry see Field 5B.
W74-09929

GROUNDWATER OF SIBERIA AND SOVIET FAR EAST (PODZEMNYYE VODY SIBIRI I DAL'NEGO VOSTOKA),
For primary bibliographic entry see Field 2F.
W74-09936

HYDROLOGIC DATA OF THE NEPONSET AND WEYMOUTH RIVER BASINS, MASSACHUSETTS,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 4A.
W74-09945

LONG ISLAND WATER,
For primary bibliographic entry see Field 2F.
W74-09961

METHOD FOR CONTROLLING FLOW OF AQUEOUS FLUIDS IN SUBTERRANEAN FORMATIONS,
Dow Chemical Co., Midland, Mich.
For primary bibliographic entry see Field 8G.
W74-10029

A THEORETICAL STUDY OF GEOTHERMAL ENERGY EXTRACTION,
Los Alamos Scientific Lab., N. Mex.
F. H. Harlow, and W. E. Pracht.
Journal of Geophysical Research, Vol 77, No 35, p 7038-7048, December, 1972. 3 fig, 2 tab, 7 ref.

Descriptors: *Geothermal studies, Thermal water, *Theoretical analysis, Energy.
Identifiers: *Geothermal energy extraction, *Thermal power, Geothermal well life.

The principal conclusions from this study are that under sufficiently favorable circumstances large amounts of geothermal energy can be extracted from dry wells in hot rock. This conclusion does not depend strongly on the nature of the initial hydraulic fracture, but it does depend on the validity of the thermal fracture hypothesis and on the assumption that underground leakage does not preclude the maintenance of pressure. These features will require field testing. (Staplin-NWWA)
W74-10087

WATER IS WHERE YOU FIND IT,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 8B.
W74-10094

TEST WELL YIELDS DATA ON HYDROGEOLOGIC PROPERTIES OF SUBSURFACE MATERIALS,
Geological Survey, Washington, D.C. Water Resources Div.
H. E. Pearson.
The Johnson Drillers Journal, p 1-3, September-October, 1973. 3 fig, 2 tab.

Descriptors: *Test wells, *Observations wells, Borehole geophysics, Water quality, Water levels, Pump testing, Water yield, *Basalts, *Washington.
Identifiers: *Paterson(Wash), *Hydrogeologic properties, Exploration tests.

A special test-observation well was drilled near Paterson, Washington to gather hydrologic data needed to understand groundwater occurrences in basalt sequences. These data were obtained from sample analysis and a suite of geophysical logs that included a caliper log, a fluid resist log, a temperature log, and a gamma-ray log. Two pump tests were performed to determine the potential yield of the producing intervals encountered in the well. The potential yield, water level, degree of hydraulic communication, and chemical quality of the groundwater are described for each of the horizons. (Staplin-NWWA)
W74-10095

DETERMINING FRACTURE PRESSURE GRADIENTS FROM WELL LOGS,
Schlumberger Well Services, Houston, Tex.
For primary bibliographic entry see Field 8B.
W74-10099

RESISTIVITY METHODS IN PROSPECTING FOR GROUND WATER,
Kansas State Univ., Manhattan. Dept. of Geology.
D. W. Steeples.
Master's Thesis, 1970. 47 p, 7 fig, 4 tab, 27 ref, 1 append.

Descriptors: *Exploration, *Resistivity, Alluvial aquifers, Geophysics, Subsurface investigations, *Kansas, Groundwater.
Identifiers: *Groundwater exploration.

A technique for groundwater exploration in alluvial sediments near Manhattan, Kansas was developed utilizing direct current earth resistivity. The resistivity survey was performed with portable current equipment in a four-square-mile area just east of Manhattan, Kansas. The Wenner configuration became the basis for the field work. Interpretation methods included curve inspection, Moore cumulative resistivity method, Roman's curve-matching method, and relative resistivity mapping using Keck's curves to adjust the values obtained in the field. These make it possible to map relative resistivity for specified electrode spacing intervals. The relative resistivity maps were compared with an analog computer model of transmissivity in the same four-square-mile area. The comparison showed similar trends for high resistivity and high transmissivity values. It was inferred that high resistivity and high transmissivity have a substantial degree of correlation. Wider electrode spacing intervals showed probable trends for the direction of erosional channels in bedrock in a river valley. The method developed can be recommended for use in areas where alluvium covers bedrock. The method should not be used by itself without test drilling or some other independent method of exploration. (Staplin-NWWA)
W74-10100

POTENTIAL USES FOR BOREHOLE LOGS IN MINERAL EXPLORATION,
Sproule (J. C.) and Associates Ltd., Calgary (Alberta).
For primary bibliographic entry see Field 8G.
W74-10105

THE STATES ENTER THE RURAL WATER PICTURE,
Conset, Inc., Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10106

ARTIFICIAL REPLENISHMENT OF GROUNDWATER STORAGE (OBISKUSSTVENNOM VOSPOLNENII ZAPASOV PODZEMNYKH VOD),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrogeologii i Inzhenerno Geologii, Moscow (USSR).
M. A. Khordikaynen.
Vodnyye Resursy, No 2, p 170-179, 1974. 1 fig, 26 ref.

Descriptors: *Groundwater, *Groundwater recharge, *Artificial recharge, Induced infiltration, Aquifers, Water supply, Zoning.
Identifiers: *USSR(Kazakhstan).

Principles of application and development of artificial replenishment of groundwater storage are discussed. Methods of artificial replenishment are described, and its application in the USSR and foreign countries is reviewed. Principles and methods of small-scale zoning of the USSR based on artificial groundwater replenishment conditions are presented. A part of Central Kazakhstan was used to illustrate this zoning. (Josefson-USGS)
W74-10223

WATER RESOURCES OF THE KOMI ASSR AND PROSPECTS OF THEIR USE (VODNYYE RESURSY KOMI ASSR I PERSPECKTIVY IKH ISPOL'ZOVANIYA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 4A.
W74-10230

RECONNAISSANCE OF WATER QUALITY IN THE VICINITY OF SUNNILAND OIL FIELD, COLLIER COUNTY, FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W74-10240

ISOTOPIC AND CHEMICAL CHARACTERISTICS OF HIGH-LEVEL GROUNDWATER ON OAHU, HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
T. H. Hufen, R. W. Buddemeier, and L. S. Lau.
Water Resources Research, Vol 10, No 2, p 366-370, April, 1974. 4 fig, 2 tab, 18 ref. OWRR B-019-H1(1).

Descriptors: *Groundwater, *Geohydrology, *Radiocarbon, Tritium, Tunnels, Soil, Isotopes, Chemistry, *Hawaii, *Chemical properties.
Identifiers: *Isotopic composition, Oahu(Hawaii), Dike waters.

High level dike-confined groundwaters and high-level perched groundwaters on Oahu, Hawaii, were analyzed for tritium, radiocarbon, carbon 13, and several chemical constituents. Discharges from several tunnels that tap dike compartments contain postbomb tritium, indicating the presence of modern (since 1954) recharge. The amount of this recharge in samples taken inside one of the tunnels is a function of the distance between overlying surface and sampling point. Chemical and carbon isotopic compositions of dike waters, established in the soil zone of their overlying ground surface, remain unchanged while the water is passing through the basaltic carbonate-free compartments. Dike water carbon isotope data are sufficiently consistent to serve as initial values for the dating of water in the Honolulu basal aquifers. The radiocarbon data suggest that the maximum value for residence of the dike waters is of the order of 100 years. (Prague-FIRL)
W74-10273

EFFECTS OF LANDFILL DISPOSAL OF CHEMICAL WASTES ON GROUNDWATER QUALITY,
Minnesota Univ., Minneapolis. School of Public Health.
For primary bibliographic entry see Field 5B.
W74-10278

OPTIMAL PUMPING FOR AQUIFER DEWATERING,
Stanford Univ., Calif. Dept. of Geology.
E. Aguado, I. Remson, M. F. Pikul, and W. A. Thomas.
Journal of the Hydraulics Division, American Society of Civil Engineers Vol 100, No HY7, Paper 10639, p 869-877, July 1974. 5 fig, 1 tab, 3 ref.

Descriptors: *Aquifers, *Dewatering, *Drainage, *Groundwater, Hydraulics, *Linear programming, Management, Optimization, Constraints, Equations, Wells, Pumping, Methodology, Mathematical models, Systems analysis.
Identifiers: *Finite differences.

A method, using finite difference approximations of the groundwater differential equation as constrints in a linear programming model, is presented for determining the optimal well locations and steady-state pumping scheme for dewatering a construction site. Use of the method to determine optimal well distributions and steady-state pump-

ing patterns for dewatering a dry dock excavation site is described. Because the currently available linear programming method is restricted to steady-state solutions, auxiliary use was made of the preceding transient numerical model to predict dewatering times. Further development of the transient versions of the linear programming model is in progress. Solutions of alternate optimization problems may be readily achieved; for example, it might be desirable to restrict the number of wells or their locations, and it might be desirable to consider economic factors. Such solutions may be achieved with modifications of constraints or objective functions. The linear programming methodology is shown to have provided a scheme for the efficient allocation of wells and pumping to achieve a desired distribution of hydraulic heads. (Bell-Cornell)
W74-10325

4C. Effects On Water Of Man'S Non-Water Activities

A PRELIMINARY REPORT ON URBAN HYDROLOGY AND URBAN WATER RESOURCES: OAHU, HAWAII,
Hawaii Unin., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 2A.
W74-09803

SEASONAL EFFECTS IN FLOOD SYNTHESIS,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
E. F. Brater, S. Sangal, and J. D. Sherrill.
Water Resources Research, Vol 10, No 3, p 441-445, June 1974. 6 fig, 3 tab, 8 ref.

Descriptors: *Urbanization, *Flood forecasting, *Snowmelt, *Model studies, Hydraulic models, Hydrograph analysis, Synthetic hydrology, Michigan, Flood frequency, Rainfall-runoff relationships, Seasonal, Urban hydrology, Urban runoff, Duration curves, Rainfall intensity.

The effect of urbanization on flood flows was investigated by analyzing inputs and corresponding flood hydrographs from many watersheds along with corresponding inputs and responses from watershed models. The inputs consisted of precipitation plus snowmelt minus infiltration and retention. Because of the large seasonal variation in infiltration rates, accuracy was inproved by treating rainfall frequencies seasonally in predicting flood runoff from precipitation and snowmelt. As procedures were developed and improved in accuracy, it became necessary to examine the effect of snowmelt on winter frequencies and the seasonal variation in time and intensity of rainfall patterns more closely. A procedure was developed for including snowmelt with winter rains, and the resulting frequency curves of rain plus snowmelt are presented and compared with conventional rainfall frequency curves. A method of deriving time-intensity patterns from daily rainfall was developed. A large difference exists between typical winter and summer patterns in southeastern Michigan. (Knapp-USGS)
W74-09910

PROBLEMS IN MODELING URBAN WATERSHEDS,
American Society of Civil Engineers, Marblehead, Mass. Urban Water Resources Research Program.
M. B. McPherson, and W. J. Schneider.
Water Resources Research, Vol 10, No 3, p 434-440, June 1974. 3 fig, 45 ref.

Descriptors: *Urban hydrology, *Urban runoff, *Model studies, *Simulation analysis, Rainfall-runoff relationships, Water quality, Storm runoff, Reviews, Runoff forecasting, Mathematical models, Water management(Applied), Urban drainage, Storm drains.

Modeling of urban watersheds is complicated by the complexities of the hydrologic system brought about by urbanization, model scale, and client diffusion. Modeling objectives vary widely, from storm sewer design to management of local runoff to river basin planning. Each objective requires a different approach to modeling. Current difficulties in modeling involve inherent nonlinearities in most methods of processing input for linear models, problems of storm definition, interconnection of urban catchment areas, and shortage of detailed rainfall-runoff water quality data for calibration. Despite handicaps, progress has been made in modeling urban watersheds and will continue to be made. (Knapp-USGS)
W74-09911

A PROPOSED OPEN BEACHES STATUTE FOR FLORIDA,
Miami Univ., Fla. Ocean Law Program.
For primary bibliographic entry see Field 2J.
W74-09977

GUIDELINES FOR THE DESIGN OF SUBSURFACE DRAINAGE SYSTEMS FOR HIGHWAY STRUCTURAL SECTIONS,
Cedergren/KOA, Sacramento, Calif.
H. R. Cedergren, K. H. O'Brien, and J. A. Arman.
Available from NTIS, Springfield, Va 22151 as PB-220 116; Price $3.00 printed copy; $1.45 microfiche. Joint Venture Report to Dept of Transportation, Federal Highway Administration, June 1972. 24 p, 13 fig. Dept. of Trans. Contract FH-11-7582.

Descriptors: *Subsurface drains, *Paving, *Highways, *Drainage systems, Runoff, *Design, Infiltration, Construction joints, Subsurface drainage.

Design for pavement subsurface drainage systems includes open-graded drainage layers, collector drains, pipe outlets and markers. Design examples are given for embankment sections, cut sections and superelevated curves. Emphasis is on draining water that infiltrates the pavement structure from the surface through cracks, construction joints, and through permeable surfaces, medians and shoulders. General guidance is given for design, construction, and operation of subsurface drainage systems. (Knapp-USGS)
W74-10235

4D. Watershed Protection

DRAINAGE AND EROSION CONTROL FACILITIES, FIELD PERFORMANCE INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8A.
W74-09948

MEASUREMENT AND MANAGEMENT ASPECTS OF WATER TOXICOLOGY: THE MALIBU WATERSHED A MIXED RESIDENTIAL AND WILDNESS AREA,
California Univ., Los Angeles. School of Public Health.
For primary bibliographic entry see Field 5B.
W74-09950

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

DISTRIBUTION OF TRACE METALS IN A WARM WATER RELEASE IMPOUNDMENT,
Quachita Baptist Univ., Arkadelphia, Ark.
For primary bibliographic entry see Field 2H.
W74-09801

DETERMINATION OF NITRITE AND NITRATE IONS IN NATURAL WATERS USING AROMATIC ORTHO DIAMINES AS REAGENTS,
Wisconsin Univ., Green Bay. Ecosystems Analysis.
P. J. Canney, D. E. Armstrong, and J. H. Wiersma.
Available from the National Technical Information Service as PB-233 786 $3.25 in paper copy, $1.45 in microfiche. Wisconsin Water Resources Center, Madison Technical Report, WRC-WIS 74-04, June 1974. 30 p, 6 fig, 5 tab, 26 ref. OWRR A-051-WIS(2), 14-31-0001,3850, 14-31-0001-4050.

Descriptors: *Nitrogen, *Nitrates, *Nitrites, *Analytical techniques, Water quality, Organic compounds, Ions, *Pollutant identification, Ion exchange, Spectrophotometry, Aromatic compounds.
Identifiers: Reagents.

Nine reagents were evaluated for suitability as reagents for the determination of nitrite nitrogen. The reagents were 1,8-diaminonaphthalene and 8 aromatic orthodiamines. The aromatic orthodiamines react to form triazoles determinable by fluorometric or spectrophotometric methods. Of the reagents evaluated, 2,3-diaminofluorene (2,3-DAF) and 5-(3,4-diaminophenyl)-2,1,3-benzoselenadiazole (DABSe) were selected for analytical use. Several reagents reacted with Nitrite, but were eliminated because of poor sensitivity or lack of conformity to Beer's Law. The DABSe method involved extraction of the product with 1,2-dichloroethane (DCE), while the DCE extraction and aqueous procedures were developed for 2,3-DAF. Detection limits for nitrite N were 1,5, and 1 microgram per liter for the DABSe, aqueous 2,3-DAF, and DCE-2,3-DAF methods. Interferences from high concentrations of manganese dioxide and Fe (III) were eliminated by filtration and ion exchange treatments. Attempts to develop a nitrate procedure involving reduction of nitrate to nitrite in the presence of DABSe or 2,3-DAF were unsuccessful. However, both methods were compatible with nitrate determination based on reduction of nitrate to nitrite with a Cd-Hg column. For nitrite and nitrate determination the DABSe and 2,3-DAF methods performed as well as the sulfanilic acid and 1-napththylamine method.
W74-09809

MODELS AND COMPUTER CODES FOR EVALUATING ENVIRONMENTAL RADIATION DOSES,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5B.
W74-09824

ANNUAL PROGRESS REPORT FOR THE PERIOD JULY 1971-JUNE 1972-NEW BRUNSWICK LABORATORY.
New Brunswick Lab. (AEC), N.J.
Aval: NTIS, Springfield, Va., as Rept. No. NBL-265, $5.45/copy, $1.45/microfiche. Report No. NBL-265, October 1972. 111 p, 14 fig, 41 tab, 101 ref.

Descriptors: *Research and development, *Laboratories, *Analytical techniques, Research facilities, Technology, Elements(Chemical), Radioisotopes, Abstracts, Documentation, *Bibliographies, *Reviews.

An AEC Research and Development annual report of the activities at the New Brunswick Laboratory includes abstracts of approximately 25 reports of progress on various analytical techniques. Some of the more important elements of concern are uranium, thorium, sodium, carbon, iron, chromium, manganese, boron, and plutonium. (Houser-ORNL)
W74-09830

TRACE ELEMENT MEASUREMENTS AT THE COAL-FIRED ALLEN STEAM PLANT - PROGRESS REPORT, JUNE 1971 TO JANUARY 1973,
Oak Ridge National Lab., Tenn.
N. E. Bolton, R. I. Van Hook, W. Fulkerson, W. S. Lyon, and A. W. Andren.
Aval: NTIS, Springfield, Va., as Rept. No. ORNL-NSF-EP-43; $5.45/copy, $1.45/microfiche. Report No. ORNL-NSF-EP-43, March 1973. 89 p, 24 fig, 12 tab, 27 ref, 5 append.

Descriptors: *Trace elements, Geochemistry, *Steam turbines, *Electric plants, Fuels, *Coals, Effluents, *Monitoring, Surveys, Sampling, Analytical techniques, Water pollution, Water pollution sources, Fallout, Soil contamination, Ecology, Meteorology, Lakes, Streams, Mississippi River, Sediment, Environmental effects, *Tennessee.
Identifiers: *McKellar Lake(Tenn), *Horn Lake(Tenn).

Oak Ridge National Laboratory is investigating rthe disposition of trace elements from coal combustion at the Tennessee Valley Authority (TVA) Thomas A. Allen Steam Plant in Memphis, Tennessee. The study consists of two parts: (a) in-plant sampling to obtain a mass balance for an extensive suite of elements and (b) sampling in the environment around the plant to ascertain the fate of the discharges of these elements. To date, with the assistance of TVA, one set of in-plant sampling runs for one of the three independent cyclone boilers at the plant has been obtained. Measurements by neutron activation analysis, spark source mass spectroscopy (with isotope dilution for some elements), and atomic absorption spectroscopy yielded an approximate balance for many elements. Measurements of the elemental composition of the other specimens collected have not yet been completed. (Houser-ORNL)
W74-09833

LABORTORY TESTING AND FIELD TEST SUPPORT OF THE SO-2 STACK GAS MONITOR,
Industrial Nucleonics Corp., Columbus, Ohio. New Ventures Div.
R. J. Pfeifer.
Aval: NTIS, Springfield, Va., as Rept. No. COO-3218-2; $4/copy, $1.45/microfiche. Final Report No. COO-3218-2, December 31, 1973. 32 p, 3 fig, 1 tab.

Descriptors: *Monitoring, *Sulfur compounds, Fuels, Coals, Oxides, *Gases, Instrumentation, Gages, Effluents, *Measurement, *Testing, *Air pollution.

The program to develop a stack gas monitor which utilizes appropriate nucleonic techniques has been a technical success. The gauge so developed possesses certain marked advantages over competitive sulfur dioxide monitors. In particular, the Mercury Substitution and Nucleonic Detection (MSND) working model requires a simple sampling system and is virtually insensitive to interfering substances typically found in stack gas emissions. Additional laboratory tests have been conducted in lieu of the field test program. The guage is currently available for field testing if a site can be identified and if the requirement for such testing is ascertained. (Houser-ORNL)
W74-09834

NSF-RANN TRACE CONTAMINANTS ABSTRACTS.
Oak Ridge National Lab., Tenn. Toxic Materials Information Center.
Report No. ORNL-EIS-73-60, Vol 1, No 1, June 1973. 41 p, 51 ref, 3 indexes.

Descriptors: *Trace elements, *Toxicity, *Air pollution, *Water pollution, *Water pollution sources, *Soil contamination, Fallout, Effluents, Absorption, Ecology, Ecosystems, Hydrology, Environment, Environmental effects, Geochemistry, Water chemistry, Public health, Information exchange, Publications, Documentation, Abstracts.
Identifiers: *Environmental impact.

The Toxic Materials Information Center, Environmental Information System Office, assumes additional responsibility for service to the NSF-RANN Trace Contaminants Program with this initial issue of Trace Contaminants Abstracts; a program oriented to serve as a communications link, making dissemination of research results to a large audience a simple, easy procedure for all investigators. The TMIC is a project support center for the Ecology and Analysis of Trace Contaminants Program at ORNL; its purpose is to acquire, store, retrieve, and disseminate data on toxic materials in the environment, with particular emphasis on metals and organometallic compounds. While its major purpose is to serve the ORNL researchers in this program, other Trace Contaminants Program investigators, other governmental agencies, and the public in general may query the center's file--to the degree that present funding and staffing allow. Present TMIC computerized holdings number approximately 10,000 abstracted citations, while approximately 25,000 other items are available for manual search. The TMIC is a component of a larger broad-coverage Environmental Information System Office at Oak Ridge National Laboratory, serving several government agencies in addition to NSF and AEC. Other areas of concern include energy, land use, toxicology, mutagenecity, and all forms of environmental impact. (Houser-ORNL)
W74-09835

PRELIMINARY EVALUATION OF METHODS FOR THE DISPOSAL OF TRITIATED WATER FROM NUCLEARLY STIMULATED NATURAL GAS WELLS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5C.
W74-09837

ENVIRONMENTAL MONITORING AT MAJOR U.S. ATOMIC ENERGY COMMISSION CONTRACTOR SITES, CALENDAR YEAR 1972.
Division of Operational Safety (AEC), Washington, D.C.
Aval: NTIS, Springfield, Va., as Rept. No. WASH-1259; $16.25/copy, $1.45/microfiche. Report WASH-1259, August 1973. 1223 p, 154 fig, 357 tab, 176 ref, 28 append, 9 attach.

Descriptors: *Monitoring, *Environment, Environmental effects, Environmental control, Nuclear energy, Effluents, Atmosphere, *Radioactivity, Air pollution, Water pollution, Water pollution sources, Soil contamination, Fallout, Meteorology, Hydrology, Waste disposal, Public health, Soils, Sediments, Ecology, Ecosystems, Silts, Food chains, Laboratories, Nuclear powerplants, Research and development.
Identifiers: *Atomic Energy Commission.

The purpose of this compendium is to provide a compilation of the annual reports summarizing the results of the environmental monitoring programs conducted at each of the Atomic Energy Commission sites which have a potential for environmental impact or which release a significant quantity of radioactivity or nonradioactive wastes. The individual reports comprising this compendium were prepared in accordance with AEC requirements for environmental monitoring and reporting. Each contains data on the levels of radioactivity and nonradioactive pollutants in the environs of each site, and an interpretation of the sampling results in relation to the appropriate standards for environmental protection. This compendium has been compiled, and is being published for the first time this year, as a central reference document describing the results of the environmental programs conducted at all of the AEC sites. (See W74-09841 thru W74-09859) (Houser-ORNL)
W74-09840

ENVIRONMENTAL MONITORING AND POLLUTANT INVENTORY PROGRAM REPORT FOR PANTEX PLANT (AMARILLO, TEXAS), COVERING CALENDAR YEAR 1972.
Mason and Hanger - Silas Mason Co., Inc., Amarillo, Tex.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 129-176, 8 tab, 11 ref, 1 append, 7 attachments.

Descriptors: *Nuclear energy, *Effluents, *Nuclear explosions, *Fallout, *Plutonium, *Uranium, Water pollution, Air pollution, Soil contamination, Analytical techniques, Sampling, Safety, Assessment, Public health, *Texas.

Data are provided on the pollutant inventory program and the radiological and nonradiological environment surrounding the Pantex Plant at Amarillo, Texas. Major concern is given to the environmental condition after firing test shots which release uranium into the atmosphere. The deposition of radioactive materials from the dust clouds formed is traced to the soil, vegetation, and surface water. Routine analyses of offsite samples are made to determine the impact of the plant operations upon the surrounding environment. Data on concentration of uranium and plutonium in soil, vegetation, and water are given. (See also W74-09840) (Howser-ORNL)
W74-09841

ENVIRONMENTAL MONITORING REPORT, 1972, PINELLAS PLANT, ST. PETERSBURG, FLORIDA.
General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission, Contractor Sites, Calendar Year 1972, Report WASH-1259, p 177-196, August 1973. 3 fig, 4 tab.

Descriptors: *Monitoring, *Environment, *Nuclear energy, *Effluents, *Tritium, *Krypton, Sampling, Analytical techniques, Assay, Regulation, Water pollution, Water pollution sources, Public health, *Florida.

The Pinellas Plant is located on a 100-acre site in the center of Pinellas County, Florida. The primary radionuclide used at the plant is tritium. The hazardous aspects of tritium are pointed out and detail is given for monitoring the plant effluents for tritium and krypton. Off-site surface water samples are collected, analyzed, and reported. On-site sampling includes the sewage treatment facilities, industrial wastewaters, and stack effluents. Data reported indicate the concentration of the radionuclides around the plant area to be well below the maximum permissible limits. (See also W74-09840) (Houser-ORNL)
W74-09842

ANNUAL ENVIRONMENTAL MONITORING REPORT - ROCKY FLATS PLANT, (COLORADO), JANUARY THROUGH DECEMBER, 1972,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
M. R. Boss, F. D. Hobbs, R. W. Loser, and D. E. Michels.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 197-230, August 1973. 6 fig, 16 tab, 9 ref.

Descriptors: *Monitoring, *Environment, *Surveys, *Effluents, *Radioactivity, *Air pollution, *Water pollution, *Soil contamination, Ecology, Streams, Reservoirs, Measurement, Assay, Plutonium, Computer program, Model studies, Standards, Regulation, Public health, *Colorado.
Identifiers: *Great Western Reservoir, *Walnut Creek, *Woman Creek, *Standley Lake, *Mower Reservoir.

Results of the environmental monitoring program in the vicinity of the Rocky Flats Plant during 1972 indicate that yearly average environmental concentration of plutonium in air and water was less than 2% of applicable Federal Standards. Total long-lived alpha emitter concentration in air, including natural background, was less than 30% of the soluble plutonium-239 standard. No apparent changes were noted in the distribution of plutonium in soil from previous years. Changes in the distribution isopleths compared with 1971 are a result of additional sample results in the computer modeling program and do not reflect physical movement of plutonium in soils. (See also W74-09840) (Houser-ORNL)
W74-09843

ENVIRONMENTAL REPORT FOR CALENDAR YEAR 1972 ON RADIOLOGICAL AND NON-RADIOLOGICAL PARAMETERS, (BATTELLE COLUMBUS LABORATORIES, OHIO).
Battelle Columbus Lab., Ohio. Health Physics Services.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 401-412, August 1973. 4 fig, 2 tab, 3 ref.

Descriptors: *Monitoring, *Radioactivity, *Environment, *Effluents, *Assay, Measurement, Uranium, Plutonium, Research and development, Laboratories, Water pollution, Water pollution sources, Standards, Regulation, Public health, Analytical techniques, Safety, Evaluation, *Ohio.

The radiological operations at the West Jefferson Nuclear Center during 1972 were basically without incident in respect to the environs. The King Avenue, Building 3 Site has experienced a substantial decrease in contract uranium activities and no incidents were recorded that resulted in excessive air or water effluent releases to the environs. One instance of inadvertent dumping of mop water at the JN-1 Hot Cell into the sanitary system occurred. This was detected and remedied without serious consequences. Sampling at the release point of the filter bed showed that concentrations were less than the Concentration Guides for release to uncontrolled areas as per AECM 0524(1). (See also W74-09840) (Houser-ORNL)
W74-09844

1972 ENVIRONMENTAL MONITORING REPORT - BROOKHAVEN NATIONAL LABORATORY, (NEW YORK).
Brookhaven National Lab., Upton, N.Y.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 413-466, August 1973. 6 fig, 19 tab, 8 ref.

Descriptors: *Monitoring, *Environment, *Laboratories, *Radioactivity, *Measurement, Assay, Safety, Evaluation, Effluents, Deposition(Sediments), Ion transport, Path of pollutants, Groundwater, Streams, Rivers, Potable water, Standards, Regulation, Ecology, Public health, Environmental effects, *New York.
Identifiers: Peconic River, Concentration.

Natural background and radiation levels in the vicinity of Brookhaven National Laboratory attributable to its operations during 1972 are summarized. Among the data reported are external radiation levels; air particulate, tritium and radioiodine concentrations; precipitation and liquid effluent-related concentrations in stream, ground water and surveillance wells, as well as in milk, grass and soil samples. About 83% of the volume of liquid effluent released onto the sand filter beds at the BNL sewage treatment plant was recovered and flowed into the headwaters of the Peconic River, while about 17% of it flowed into the ground water underlying the beds. The gross concentration of beta and gamma-emitters in it was 1.9% of the applicable radiation standard. Tritium, which is measured separately, was 0.13% of its standard. The water released into the Peconic from the Liquid Effluent Treatment Facility was well within the standards for drinking water quality established by the New York State Department of Health. (See also W74-09840) (Houser-ORNL)
W74-09845

ENVIRONMENTAL MONITORING REPORT OF THE LACROSSE BOILING WATER REACTOR (WISCONSIN) FROM JANUARY 1, 1971 TO DECEMBER 31, 1972.
Dairyland Power, Cooperative, LaCrosse, Wis.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 529-552, August 1973. 4 fig, 10 tab, 1 append.

Descriptors: *Monitoring, *Environment, *Nuclear powerplants, *Effluents, Sampling, Air, Rivers, Sediments, Milk, Fish, Vegetation, Radiation, Measurement, Assay, Safety, Evaluation, *Wisconsin.

The monitoring program at the LaCrosse Wisconsin plant includes monitoring of liquid and gaseous releases from the plant as well as environmental samples of surface air, river water, sediment, milk, fish, vegetation, and penetrating radiation. The dose at the site boundary of the LACBWR facility was determined by Thermoluminescent Dosimetry (TLD's) to be approximately 20-30 mrem/yr. The TLD's data were found to correspond closely with the plume from the plant. The off-site exposures received from the facility were well within the exposure guidelines to the general population. The activities found in the environmental samples, (i.e., milk, water, fish, etc.,) collected in 1972 in the vicinity of the LACBWR facility were within the range of the natural background. (See also W74-09840) (Houser-ORNL)
W74-09846

ENVIRONMENTAL MONITORING REPORT FOR CALENDAR YEAR 1972 FOR THE NATIONAL ACCELERATOR LABORATORY, BATAVIA, ILLINOIS,
National Accelerator Lab., Batavia, Ill.
S. I. Baker.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 553-596, August 1973. 4 fig, 5 tab, 18 ref.

Descriptors: *Monitoring, *Effluents, *Radioactivity, *Nuclear energy, Laboratories, Research and development, Air pollution, Water pollution, Streams, Water wells, Groundwater, Sampling, Analytical procedures, Measurement, *Illinois.
Identifiers: *Accelerators.

Environmental radiation data are collected from a multitude of radiation detectors throughout the accelerator and experimental areas. The three types of accelerators which produced radiation meriting monitoring for environmental purposes are discussed. The three types are: (1) penetrating radiation; (2) air-borne radioactivity; (3) water-borne radioactivity. Monthly water samples are taken from two ground water systems which represent the surface and near-surface waters and the Silurian Aquifer which is a prime water supply for many private residences in the area. Detail is given for water sample collection and the analytical procedures used for measuring the radioactivity. No measurable concentrations of accelerator-produced radionuclides were found in the surface or ground waters. The high purity necessary for drinking water has been maintained in the domestic water supply. (See also W74-09840) (Houser-ORNL)
W74-09847

1972 NATIONAL REACTOR TESTING STATION ENVIRONMENTAL MONITORING PROGRAM REPORT, (IDAHO FALLS, IDAHO).
Idaho Operations Office (AEC), Idaho Falls. Health Services Lab.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 597-628, August 1973. 6 fig, 9 tab.

Descriptors: *Monitoring, *Environment, *Measurement, *Background radiation, *Radioactivity, Air pollution, Water pollution, Water pollution sources, Tritium, Strontium, Fallout, Sampling, Wheat, Milk, Surface waters, Water wells, *Idaho.

None of the off-site well water or surface water samples contained any gross alpha, gross beta, or tritium activity above the detection limits of the analyses. The only fission or activation product detected in milk samples was Sr-90. However, the Sr-90 concentrations are similar to those reported for the region in the U.S. Environmental Protection Agency's Radiation Data and Reports, and the source is assumed to be fallout from nuclear device testing and not NRTS operations. Wheat samples collected at harvest also contained small amounts of Sr-90 from worldwide fallout. The results of the air monitoring program for 1972 indicated that on-site and off-site air concentrations resulting from NRTS releases were indistinguishable from the natural radioactivity in air. (See also W74-09840) (Houser-ORNL)
W74-09848

EFFLUENT AND ENVIRONMENTAL MONITORING REPORT FOR CALENDAR YEAR 1972 FOR THE BETTIS ATOMIC POWER LABORATORY, (PITTSBURGH, PENNSYLVANIA).
Bettis Atomic Power Lab., Pittsburgh, Pa.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 629-654, August 1973. 2 fig, 3 tab, 4 append.

Descriptors: *Monitoring, *Environment, Laboratories, *Research and development, *Nuclear powerplants, *Effluents, Radioactivity, Radioactive waste disposal, Safety, Evaluation, Standards, Regulation, Management, Air, Liquid, Silts, Streams, Measurement, Sampling, Analytical techniques, Public health, *Pennsylvania.

Results are summarized for the period from January through December 1972, of the effluent and environmental monitoring program conducted at the Bettis Atomic Power Laboratory. The program has been continuously maintained since 1959 and regulates the disposal of solid, liquid and airborne effluents from the laboratory. Since its inception, the data obtained from this program have shown

that the Laboratory's procedures for controlling effluents are adequate to ensure that all releases to the environment are made in accordance with the applicable requirements. The program includes sampling and analysis of exhaust air, liquid effluents, and silt and water samples from the small streams on the Laboratory site and in the nearby area. Evaluation of these data, along with the analysis of the environmental radiation measurements provides the basis for assessing the environmental impact due to Laboratory operations. (See also W74-09840) (Houser-ORNL)
W74-09849

KNOLLS ATOMIC POWER LABORATORY (SCHENECTADY, NEW YORK) ANNUAL ENVIRONMENTAL MONITORING REPORT CALENDAR YEAR 1972.
Knolls Atomic Power Lab., Schenectady, N.Y.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 655-698, August 1973. 4 fig, 7 tab, 8 ref.

Descriptors: *Monitoring, *Environment, Laboratories, *Effluents, *Radioactivity, *Measurement, Water quality control, Regulation, Standards, Abatement, Rivers, Waste disposal, Discharge(Water), Sampling, *New York, Analytical techniques.
Identifiers: *Mohawk River.

Regulations for the prevention, control and abatement of air and water pollution are in compliance with the requirements of AEC Manual Chapter 0510. Other documents provide additional guidelines. Water released from the Knolls Site enters the Mohawk River at a point approximately 40 ft from shore. This water has several sources, such as storm drainage, city water used in laboratory, sanitary and shop applications, and Mohawk River water. The average water discharge rate measured during 1972 was approximately 500 gallons per minute which represents less than 0.1% of the median Mohawk River flow rate. Of the volume discharged, approximately 60% is storm drainage and river water. A continuous proportional sample of the water released is collected and analyzed for those constituents suggested by New York State which are of importance in drinking water or stream standards. In addition, continuous measurements are made and recorded for flow, pH and temperature. Periodic samples are taken of the Mohawk River downstream and upstream of the Knolls Site to check on its water quality. The results show Knolls Site operations have had no significant effect on the Mohawk River. Combustion gas products are generated from the operation of the Site steam-generating systems. The sulfur content of the fuel used and smoke emissions meet State standards. (See also W74-09840) (Houser-ORNL)
W74-09850

ANNUAL EFFLUENT DATA AND ENVIRONMENTAL MONITORING REPORT OF THE SHIPPINGPORT ATOMIC POWER STATION, (PENNSYLVANIA).
Duquesne Light Co., Shippingport, Pa.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 699-712, August 1973. 2 fig, 2 tab, 2 ref.

Descriptors: *Nuclear powerplants, *Effluents, *Monitoring, *Environment, Sampling, Water, Bottom sediments, *Ohio River, Instrumentation, Radioactivity, Measurement, Assay, Safety, Evaluation, Assessment, Regulation, Law enforcement, Water quality standards, Public health, Environmental effects, *Pennsylvania.
Identifiers: *Film badges.

Environmental monitoring was conducted during 1972 in the vicinity of the Shippingport Atomic Power Station. The Shippingport environmental monitoring program consists of sampling the water and bottom sediment of the Ohio River and posting film badges in the area of the power station. Releases of small quantities of radioactivity to the air and to the Ohio River are discussed. Additional analyses of the effluent from the portion of the facility which is operated under USAEC contract is performed to ensure that the water quality standards specified by Atomic Energy Commission Manual Chapter 0510 and the Commonwealth of Pennsylvania have been met. The results of environmental monitoring described show that Shippingport operations have not adversely affected the surrounding environment. (See also W74-09840) (Houser-ORNL)
W74-09851

ENVIRONMENTAL MONITORING REPORT FOR THE NEVADA TEST SITE AND OTHER TEST AREAS USED FOR UNDERGROUND NUCLEAR DETONATIONS - JANUARY-DECEMBER 1972.
National Environmental Research Center, Las Vegas, Nev.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 713-866, August 1973. 18 fig, 10 tab, 14 ref.

Descriptors: *Monitoring, *Environment, *Nuclear explosions, *Radioactivity, Testing, Evaluation, Sampling, Water analysis, Soil analysis, Hydrology, On-site tests, Milk, Xenon, Plutonium, Radioisotopes, Fallout, Regulation, Public health, Data collections, *Nevada.
Identifiers: *Off-site monitoring, Weapons testing, China.

During 1972, the monitoring of gamma radiation levels and concentrations of radioactivity in the environs of the Nevada Test Site (NTS) was continued through the use of off-site networks of radiation dosimeters and gamma-rate recorders, air samplers, and selected locations at which monthly samples of water and milk were collected for radiological analyses. For each of the underground nuclear detonations and the seven experimental tests of the Nuclear Furnace-1, mobile radiation monitors equipped with radiation monitoring equipment and supplies were on standby in off-site locations to respond to any inadvertent release of radioactivity which might result in a radiological hazard to off-site populations and property. The only radioactivity produced by nuclear tests at NTS and detected off-site was Xe-133, which was observed in samples collected at stations of the Noble Gas and Tritium Sampling Network at Beatty, Diablo, and Hiko, Nevada. The levels of Xe-133, which were attributed to gaseous seepage from underground tests, occurred only in a few samples. These levels, averaged over the total period sampled during the year, were less than 0.04% of the Concentration Guide of the AEC Manual, Chapter 0524, for a population sample. All other increases in radioactivity concentrations observed in media collected around the NTS were attributed to seasonal variations in old atmospheric fallout and fallout from nuclear detonations by the People's Republic of China on January 7, 1972, and March 18, 1972. (See also W74-09840) (Houser-ORNL)
W74-09852

FEED MATERIALS PRODUCTION CENTER (CINCINNATI, OHIO) ENVIRONMENTAL MONITORING ANNUAL REPORT FOR 1972.
National Lead Co. of Ohio, Cincinnati.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 867-888, August 1973. 4 fig, 5 tab, 6 ref.

Descriptors: *Monitoring, *Environment, *Effluents, *Radioactivity, *Radium, *Uranium, *Thorium, Air, Water, Fuels, Soils, Sampling, Data collections, Analytical techniques, Regulation, Standards, Operations, Fabrication, *Ohio.
Identifiers: *Great Miami River, Production plant.

Environmental monitoring data collected at the Feed Materials Production Center (FMPC) during 1972 are summarized. Data are presented for both radioactive and non-radioactive contaminants in environmental samples. These data show that the average off-site concentrations of radioactive contaminants from FMPC operations were less than 0.5% of the guide levels published in AEC Manual Chapter 0524. The resulting off-site radiation exposures would, therefore, be a small fraction of the standards for uncontrolled areas. (See also W74-09840) (Houser-ORNL)
W74-09853

ENVIRONMENTAL MONITORING REPORT - UNITED STATES ATOMIC ENERGY COMMISSION - OAK RIDGE FACILITIES, CALENDAR YEAR 1972.
Oak Ridge Gaseous Diffusion Plant, Tenn.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 889-930, August 1973. 4 fig, 21 tab, 9 ref.

Descriptors: *Monitoring, *Environment, *Effluents, *Radioactivity, Atmosphere, Water, Air, Ecology, Fish, *Tennessee River, Industrial production, Research and development, Nuclear powerplants, Uranium, Waste disposal, Waste storage, Waste treatment, Nuclear reactors.
Identifiers: *Clinch River(Tenn), White Oak Creek(Tenn), Poplar Creek(Tenn), Bear Creek(Tenn).

The Environmental Monitoring Program for the Oak Ridge area includes sampling and analysis of air, water from surface streams, several food products, flora, and soil for both radioactive and nonradioactive materials. A summary is presented of the results of the program for calendar year 1972. Surveillance of radioactivity in the Oak Ridge environs indicates the atmospheric concentrations of radioactivity were not significantly different from other areas in East Tennessee. Concentrations of radioactivity in the Clinch River and in fish collected from the river were less than one percent of the permissible concentration and intake guides for individuals in the neighboring environment. Only very low-level radioactivity is being released to the environment from plant operations and the resulting concentrations in all of the media sampled were well below permissible standards. Surveillance of nonradioactive materials in the Oak Ridge environs shows that established limits were not exceeded for those materials possibly present in the air as a result of plant operations. (See also W74-09840) (Houser-ORNL)
W74-09854

ENVIRONMENTAL MONITORING REPORT - UNITED STATES ATOMIC ENERGY COMMISSION - PADUCAH GASEOUS DIFFUSION PLANT (KENTUCKY) - CALENDAR YEAR 1972.
Paducah Gaseous Diffusion Plant, Ky.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 931-956, August 1973. 1 fig, 13 tab, 6 ref.

Descriptors: *Monitoring, *Environment, *Effluents, *Radioactivity, *Ohio River, Air, Water, Soils, Water pollution, Water pollution sources, Regulation, Assessment, Safety, Evaluation, Industrial production, Fuels, Uranium, Chromium, *Kentucky.
Identifiers: *Big Bayou(Ky), *Little Bayou(Ky).

Air, water, soil, and grass in the vicinity of the Paducah Gaseous Diffusion Plant were continuously or periodically sampled during 1972. Analyses for materials known to be in plant effluents were made to provide effluent control in-

formation and to determine compliance with applicable air and water quality standards. The air analyses for radioactivity indicate concentrations at all off-site sampling stations averaged less than one percent of the applicable Radioactivity Concentrations Guide. Air and grass off-site analyses for fluorides met the Kentucky air quality requirements. Soil samples collected to provide historical background data were analyzed for uranium. The results ranged from 1.1 ppm to 2.0 ppm at the AEC property boundary. None of these concentrations would be expected to have a significant impact on the environment. There was no detectable change in chemical, physical, or radioactive characteristics of either the Ohio River or ground water attributable to Paducah Gaseous Diffusion Plant operations. The results of water sample analyses of the Ohio River show the chromium and fluoride concentrations were in compliance with the requirements of the applicable Kentucky regulations. The concentration of hexavalent chromium at the mouth of the combined Big and Little Bayous is slightly in excess of the Ohio River Valley Sanitation Commission (ORSANCO) discharge standard of 0.05 ppm. Engineering and funding studies are in progress on chromium removal facilities. (See also W74-09840) (Houser-ORNL)
W74-09855

PORTSMOUTH GASEOUS DIFFUSION PLANT (OHIO) ENVIRONMENTAL MONITORING REPORT - 1972,
Goodyear Atomic Corp., Piketon, Ohio.
V. S. Emler, and S. H. Hullett.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 957-974, August 1973. 2 fig, 6 tab.

Descriptors: *Monitoring, *Environment, *Effluents, *Industrial production, *Radioactivity, Standards, Regulation, Measurement, Air pollution, Water pollution, Vegetation, Assessment, Safety, Evaluation, Sampling, Rivers, Streams, *Ohio.
Identifiers: *Scioto River(Ohio), *Big Beaver Creek(Ohio).

The ambient environmental standards that apply to the Portsmouth Gaseous Diffusion Plant are the radioactivity standards established by the AEC, the standards promulgated by the EPA for sulfur dioxide and particulate matter in air, and the public water-supply standards established by the Ohio Water Pollution Control Board (now the Ohio Environmental Protection Agency). At the Portsmouth Gaseous Diffusion Plant, the ambient atmosphere and all effluent streams are monitored and analyzed regularly for conformance to the applicable, specified standards. Also, because fluorides are used in the diffusion plant and because some states have established standards for fluorides in air, the concentrations of fluorides in the ambient atmosphere are measured routinely. Concentrations of fluorides in vegetation are measured because fluoride ingestion can cause adverse effects in livestock. None of the annual average concentrations of radioactivity measured at the many sampling points around the plant exceed 1.4% of the applicable standards. Background radiation levels are the same as they were in 1954 before the plant began to operate. Average concentrations of fluorides in air, fluorides in water, fluorides in vegetation, sulfur dioxide in air, and chromium in water are not excessive; average pH of water is within the specified range. Analyses for particulate matter in air showed concentrations in excess of those permitted by applicable standards, but the samples were collected only downstream from the steam plant, and, therefore, are not truly ambient averages. (See also W74-09840) (Houser-ORNL)
W74-09856

ANNUAL ENVIRONMENTAL MONITORING REPORT 1972 - LAWRENCE BERKELEY LABORATORY, (CALIFORNIA),
California Univ., Berkeley. Lawrence Berkeley Lab.
H. P. Cantelow.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 1115-1130, August 1973. 1 fig, 7 tab, 1 ref.

Descriptors: *Monitoring, *Environment, *Radioisotopes, *Radioactivity, Research and development, Effluents, Sampling, Analytical techniques, Discharge, Atmosphere, Radioactive waste disposal, Fallout, Streams, Drinking water, Standards, *California.

The use of radionuclides in the various individual research laboratories is the principal potential source of radioactive pollutants. Work on significant quantities of radioactive materials is confined to glove boxes. Each laboratory room has its own locally controlled exhaust system, discharging individually into the atmosphere. Over 100 such exhaust points exist, and are located on a number of different buildings throughout the site. Each of these is sampled and analyzed to be sure no significant quantities are released. Assessment of the possible impact of the Laboratory on its environment is carried out by two separate groups: All measurements of possible releases of radioactive materials to the environment are made by the Safety Services Department; measurements of potential gamma and neutron exposures from the operation of the many accelerators are carried out by the Health Physics Department. No radioisotopes identified as originating from LBL could be detected. (See also W74-09840) (Houser-ORNL)
W74-09857

ANNUAL ENVIRONMENTAL MONITORING REPORT OF STANFORD LINEAR ACCELERATOR CENTER (CALIFORNIA) - JANUARY-DECEMBER 1972,
Stanford Linear Accelerator Center, Calif.
D. D. Busick, and E. Holt.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 1177-1188, August 1973. 2 fig, 3 tab, 4 ref.

Descriptors: *Monitoring, *Environment, *Radioactivity, *Assessment, Background radiation, Fallout, Sampling, Analytical techniques, Soils, Vegetation, Groundwater, Surface waters, Storm sewers, Sewage effluents, Air, Public health, *California.
Identifiers: *Accelerators, *Weapons testing.

The Stanford Linear Accelerator Center (SLAC) regional surveillance program is intended to assess the contribution from SLAC operations, if any, to the existing radiation environment typically known as 'background radiation.' The term background radiation includes naturally occurring radioactive elements and man-made radio-elements usually from past atmospheric weapons' testing. Accordingly, samples of soil, vegetation, ground water, surface water, sanitary and storm sewers are periodically collected and activity levels determined. Airborne radioactivity is measured and recorded continuously at the release point. Continuous physical radiation measurements of neutron and gamma dose is also provided near the site boundary. Environmental and physical radiation monitoring locations are indicated. (See also W74-09840) (Houser-ORNL)
W74-09858

ENVIRONMENTAL MONITORING IN THE VICINITY OF THE SAVANNAH RIVER PLANT (SOUTH CAROLINA) - ANNUAL REPORT FOR 1972.
Du Pont de Nemours (E.I.) and Co., Aiken, S. C.
In: Environmental Monitoring at Major U.S. Atomic Energy Commission Contractor Sites, Calendar Year 1972, Report WASH-1259, p 1189-1217, August 1973. 4 fig, 12 tab, 10 ref, 4 append.

Descriptors: *Monitoring, *Environment, *Effluents, *Industrial production, *Nuclear reactors, Background radiation, Fallout, Radioactivity, Tritium, Cesium, Strontium, Water pollution, Fish, Sampling, Analytical techniques, Biota, Water quality, Administrative agencies, Public health, *South Carolina.
Identifiers: *Savannah River.

The quantity of radioactivity released by the Savannah River Plant (SRP) to its environs during 1972 is, for the most part, too small to be distinguished from natural background radiation and fallout from worldwide nuclear weapons tests. Particulate beta activity detectable in air is due entirely to global fallout. This concentration in air at the plant perimeter and 25 miles away represents 0.1% of the Concentration Guide. Tritium oxide in air at the plant perimeter is greater than in air at more distant locations; however, the average concentration at the plant perimeter is only 0.1% of the Concentration Guide. Tritium, cesium-137, and strontium-90 are the only radionuclides of plant origin detectable in river water. None of these had an average concentration that exceeded 0.2% of the Concentration Guide in river water sampled 8 miles downstream from the plant. Radioactive materials in river fish also continue to be very low. Various water-quality analyses of river water samples by SRP indicate that Savannah River water is not adversely affected by SRP operations. This is substantiated by surveys of the health of the Savannah River biota by the Academy of Natural Sciences of Philadelphia and pesticide analyses of river water and sediment by the United States Geological Survey Water Quality Laboratory, Washington, D.C. (See also W74-09840) (Houser-ORNL)
W74-09859

MOUND LABORATORY CHEMISTRY AND PHYSICS PROGRESS REPORT: JANUARY-MARCH 1972.
Mound Lab., Miamisburg, Ohio.
For primary bibliographic entry see Field 2K.
W74-09860

ENVIRONMENTAL MONITORING REPORT: JANUARY-JUNE 1972,
Mound Lab., Miamisburg, Ohio.
D. G. Carfagno, and W. H. Westendorf.
Available from NTIS, Springfield, Va. as Report No MLM-1973; $4.50/copy, $1.45 microfiche. Report No MLM-1973, October 1972. 18 p, 2 fig, 4 tab, 3 ref, append.

Descriptors: *Monitoring, *Environment, *Assay, *Polonium, *Plutonium, *Tritium, Measurement, Air, Water, Standards, Regulation, Food, Soils, Administrative agencies, Sampling, Analysis.

The environment surrounding Mound Laboratory, Ohio was monitored and is reported on for the first half of 1972. The average concentrations of polonium-210, plutonium-238, and tritium measured in air and water samples were well within the stringent standards adopted by the Atomic Energy Commission and the Environmental Protection Agency. (Houser-ORNL)
W74-09861

OCEANIC ATMOSPHERIC DISPERSION,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 5C.
W74-09865

FALLOUT PROGRAM--QUARTERLY SUMMARY REPORT, SEPTEMBER 1, 1973, THROUGH DECEMBER 1, 1973,
Health and Safety Lab. (AEC), New York.

E. P. Hardy, Jr.
Available from NTIS, Springfield, Va., as Rept No HASL-278; $7.60/copy, $1.45/microfiche. Report No HASL-278, January 1974. 171 p, 8 fig, 28 tab, 62 ref, 1 biblio.

Descriptors: *Radioactivity, *Fallout, *Surveys, *Sampling, Analytical techniques, Laboratories, Data collections, Air pollution, Water pollution, Soil contamination, Domestic water, Safety, Evaluation, Public health, Illinois.

Current data are presented from the HASL Fallout Program and the Radiological and Environmental Research Division at Argonne National Laboratory. Interpretive reports and notes are included on the dose to man from Pu-239 fallout; the respirable fraction of Sr-90, Pu-239, and stable lead in surface air; Cs-137 and Sr-90 in bone; the quality of 1972 surface air analyses; and quality control of 1973 samples of fallout, diet, tap water, and human bone. A bibliography of recent publications related to radionuclide studies is also presented. (See also W74-09870) (Houser-ORNL)
W74-09869

FALLOUT PROGRAM--QUARTERLY SUMMARY REPORT--JANUARY 1, 1973, THROUGH DECEMBER 1, 1973, APPENDIX,
Health and Safety Lab. (AEC), New York.
E. P. Hardy, Jr.
Available from NTIS, Springfield, Va., as Rept No HASL-278 Append., $10.60/copy, $1.45/microfiche. Report No HASL-278 Appendix, January 1974. 460 p.

Descriptors: *Radioactivity, *Radioisotopes, *Fallout, *Surveys, Data collections, Air pollution, Water pollution, Strontium, Lead, Milk.

Current data are presented from the HASL fallout program. The Appendix includes tabulations of radionuclide levels in fallout, surface air, stratospheric air, milk, diet, and tap water. (See also W74-09869) (Houser-ORNL)
W74-09870

RADIOACTIVE FALLOUT IN AIR AND RAIN: RESULTS TO THE MIDDLE OF 1973,
Atomic Energy Research Establishment, Harwell (England).
For primary bibliographic entry see Field 5B.
W74-09876

RADIOLOGICAL MONITORING PROGRAM--PERIOD COVERING MAY 17, 1973, THRU JULY 31, 1973, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Sante Fe, N.Mex. Santa Fe Lab.
For primary bibliographic entry see Field 5B.
W74-09878

DETERMINATION OF LABILE AND STRONGLY BOUND METALS IN LAKE WATER,
Canada Centre for Inland Waters, Burlington, (Ontario).
Y. K. Chau, and K. Lum-Shue-Chan.
Water Research, Vol 8, No 6, p 383-388, June 1974. 1 fig, 3 tab, 17 ref.

Descriptors: *Polarographic analysis, *Trace elements, Chelation, Aqueous solutions, Chemical analysis, Water analysis, Electrochemistry, Analytical techniques, Zinc, Cadmium, Lead, Copper.
Identifiers: *Lake water.

Differential pulse anodic stripping voltammetry was applied to differentiate and determine the labile and strongly bound forms of Zn, Cd, Pb and Cu in lake water without preconcentration of the sample. The sensitivities as established for an oxidation peak current of 0.020 microamp are: 0.2 ppb for Zn, 0.4 ppb Cd, 0.7 ppb Pb and 0.5 ppb for Cu. Interferences of cations and anions and the choice of a buffer system are discussed. The method was applied to study a number of small lakes in the Sudbury area, Ontario, Canada. (Knapp-USGS)
W74-09896

INFLUENCE OF SELECTED ORGANIC COMPOUNDS ON THE RESPONSE OF A CALCIUM ION-SELECTIVE ELECTRODE,
Montana State Univ. Bozeman. Dept. of Chemistry.
G. K. Pagenkopf, and K. A. Buell.
Water Research, Vol 8, No 6, p 375-376, June 1974. 1 tab, 7 ref.

Descriptors: *Electrodes, *Electrochemistry, *Organic compounds, *Calcium, *Water analysis, Ion exchange, Phenols, Chemical analysis.

The influence of some naturally occurring organic compounds on the response of a calcium ion-selective electrode was investigated. Phenol, resorcinol, phthalate, salicylate and humic acid cause significant interference when their concentrations are greater than 10 mg per liter. (Knapp-USGS)
W74-09897

MEASUREMENT AND MANAGEMENT ASPECTS OF WATER TOXICOLOGY: THE MALIBU WATERSHED A MIXED RESIDENTIAL AND WILDNESS AREA,
California Univ., Los Angeles. School of Public Health.
For primary bibliographic entry see Field 5B.
W74-09950

OIL-POLLUTION DETECTOR FOR USE ON MARINE PETROLEUM OPERATING/STORAGE PLATFORM - USING U-TUBE APPTS.
Texaco Development Corp., New York.
Belgian Patent 803,742. Issued February 18, 1974. Derwent Belgian Patents Report, Vol 5, No 9, p 1, April, 1974.

Descriptors: *Oil pollution, *Patents, *Density, Equipment, Oil, Water levels, *Pollutant identification.
Identifiers: *Detectors, Belgium.

An oil pollution detector is described for detection of a liquid contaminant in a stream of liquid of a different density. The stream enters a U-tube having an outlet limb at a predetermined height. The level of the liquid is detected and the variations in level are determined and show the presence of liquid contaminant in the stream of liquid. The liquid contaminant is preferably petroleum and the uncontaminated stream of liquid is water. (Merritt-FIRL)
W74-10033

RESULTS FROM MULTI-TRACE-ELEMENT NEUTRON ACTIVATION ANALYSES OF MARINE BIOLOGICAL SPECIMENS,
California Univ., Irvine. Dept. of Chemistry.
V. P. Guinn, and R. Kishore.
Journal of Radioanalytical Chemistry, Vol 19, No 2, p 367-371, 1974. 6 ref.

Descriptors: *Mercury, *Marine fish, Marine biology, *Radioactivity effects, Measurements, Sampling, Pacific Ocean, Zinc, Aquiculture, *Trace elements, *Pollutant identification.
Identifiers: Albacore, Dolphins, Killer whales, Aliquots, Selenium, Muscle tissue, *Neutron activation analysis.

Traces of mercury in marine specimens had been previously investigated and this study showed the reproducibility of replicate analyses of a given sample and of different samples (aliquots) of the same tissue from a given marine specimen. Data were obtained on the Hg, Se, and Zn levels for several different species of Pacific Ocean fish and mammals. Three variables which affect the levels of these trace elements include species, tissue, and size or age of the specimen. Sample dissection was carefully conducted and specimen size was recorded for a large number of specimens. Whereas Hg, Se, and Zn all appear to concentrate markedly in the liver of marine mammals such as dolphins and killer whales (relative to their levels in muscle tissue), only the latter two appear to concentrate appreciably in the liver of large fish such as the albacore. (Prague-FIRL)
W74-10049

CONCENTRATION AND DISTRIBUTION OF TRACE ELEMENTS IN THE MAUMEE RIVER BASIN, OHIO, INDIANA AND MICHIGAN,
Ohio State Univ., Columbus. Dept. of Geology and Mineralogy.
For primary bibliographic entry see Field 5B.
W74-10084

METHOD WITH RADIOTRACERS AND EXPERIMENTS IN HYDROCARST STRUCTURES,
Academia R. S. R., Bucharest. Institutul de Fizica Atomica.
E. Gaspar.
Available from NTIS, Springfield, Va., as Rept. No. IFA-MR-39; $3.25 paper copy, $1.45 microfiche. Report No. IFA-MR-39, 1973. 25 p, 17 fig, 1 tab, 6 ref.

Descriptors: Groundwater, *Groundwater movement, Subsurface waters, *Subsurface flow, Geology, *Karst hydrology, Hydrology, Radioactive tracers, *Hydrogeology, Inflow, Discharge(Water), Meteorology, Aquifers.
Identifiers: *Radioactive tracers.

The study of ground water circulation in karst zones and the determination of hydrogeological flow parameters in hydrokarst structures are generally difficult, due to the complexity of the investigated medium as well as to the lack of efficient investigation means. The hydrogeological phenomena of karst formations can be known if the usual means of investigation are coupled with techniques using radioactive tracers. (Houser-ORNL)
W74-10108

ENVIRONMENTAL RADIOACTIVITY ANNUAL REPORT, 1972.
National Radiation Lab., Cristchurch, (New Zealand).
Available from NTIS, Springfield, Va., as Re.00pt. No. NRL-F-50; $4.00/copy, $1.45/microfiche. Report No. NRL-F-50, April 1973. 36 p, 11 fig, 13 tab, 8 ref, append.

Descriptors: *Monitoring, *Environment, *Fallout, *Nuclear explosions, *Testing, *Radiation, Sampling, Radioisotopes, Critical path method, Public health, Rain, Milk, Meteorology, Strontium, Pacific Ocean.
Identifiers: *New Zealand, Critical radionuclide.

This report continues the re-designed series of annual reports concerned mainly with long-term levels of environmental radioactivity in New Zealand and at Fiji and Rarotonga. The types of samples measured and the collecting stations are shown. The present report should be read in conjunction with the 1971 annual report -- the first of the new style reports -- which summarized earlier reports, and discussed global fallout and specific radionuclides of potential health significance. During June and July 1972, France conducted her sixth series of nuclear tests in the South Pacific. The results of the extended program monitoring short-term levels of fallout from these tests were recently published and compared with levels moni-

tored during earlier French test series. (Houser-ORNL)
W74-10112

RADIOLOGICAL MONITORING PROGRAM, PERIOD COVERING JULY 1, 1972, THROUGH SEPTEMBER 30, 1972, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Santa Fe, N. Mex. Dept. of Nuclear Sciences.
Available from NTIS, Springfield, Va., as Rept. No. PNE-RB-51-4; $4.00/copy, $1.45/microfiche. Report No. PNE-RB-51-4, 1972. 18 p, 14 tab.

Descriptors: *Environment, *Monitoring, *Assay, *Radioactivity, Background radiation, Evaluation, Safety, Assessment, Public health, Air pollution, Water pollution, Milk, Fish, Food chains, Nuclear explosions, Sites, Streams, Lakes, Ponds, Radioisotopes.
Identifiers: *Project Rio Blanco, *Project Plowshare.

Beta radioactivity in air particulate samples for this quarter (July-September, 1972) remained at very low concentrations, ranging from 0.01 to 0.14 pCi/m3. TLD data for this quarter indicated an average background radiation dose of 3.0 millirem per week. This is consistent with the data obtained for the second quarter. Beta radioactivity in surface water ranged from 0.0 to 10.5 pCi/1. These results were in agreement with other data obtained by Eberline. Tritium concentrations were less than 1.0 pCi/ml. Gamma scans indicated no detectable activity above background and system sensitivity. Beta radioactivity in milk was consistent with the second quarter results. This beta radioactivity is due to natural K-40. Gamma scans indicated no detectable activity. Strontium-89 was not detected in any of the fish samples. The concentrations of Sr-90 in fish were consistent with other results obtained by EIC. The gamma scan indicated no detectable radioactivity other than natural occurring K-40. (Houser-ORNL)
W74-10114

RADIOLOGICAL MONITORING PROGRAM: PERIOD COVERING APRIL 1, 1972, THROUGH JUNE 30, 1972, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Santa Fe, N.Mex. Dept. of Nuclear Sciences.
Available from NTIS, Springfield, Va., as Rept. No. PNE-RB-51-3; $4.00/copy, $1.45/microfiche. Report No. PNE-RB-51-3, 1972. 22 p, 16 tab.

Descriptors: *Environment, *Monitoring, *Radioactivity, *Assay, Background radiation, Safety, Evaluation, Assessment, Air pollution, Water pollution, Soil contamination, Nuclear explosions, Fallout, Streams, Lakes, Ponds, Milk, Fish, Food chains.
Identifiers: *Project Rio Blanco, *Project Plowshare.

Beta radioactivity in air samples for this quarter (April-June 1972) ranged from 0.12 to 0.53 pCi/m3. These values are consistent with values reported by the Environmental Protection Agency (EPA) Air Surveillance Network. Gamma scans of the air particulate samples (composites) indicated trace amounts of radionuclides attributable to worldwide fallout. TLD data showed an average radiation background of 2.9 millirem per week. Beta radioactivity in surface water ranged from 0.0 to 11.6 pCi/1. Concentrations of radioactive material were too low to measure by direct gamma spectrometry. Tritium concentrations were below 1 pCi/ml. Tritium concentrations in soil moisture were too low to measure by liquid scintillation counting. Gamma scans indicated that soil radioactivity was due primarily to naturally occurring potassium, uranium, and thorium. Beta radioactivity in milk ranged from 1250 to 1740 pCi/1 and was due almost entirely to natural K-40. Sr-90 in vegetation ranged 0.66 to 1.79 pCi/g based on dry weight. Sr-89 was not detectable in any of the samples. Gamma scans did not detect any radioactivity except natural K-40. (Houser-ORNL)
W74-10115

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE MILLSTONE NUCLEAR POWER STATION, WATERFORD, CONNECTICUT, AUGUST 29 AND SEPTEMBER 11, 1969.
EG and G, Inc., Las Vegas, Nev.
Available from NTIS, Springfield, Va., as Rept. No. ARMS-69-6-5; $4.00/copy, $1.45/microfiche. Report No. ARMS-69-6-5, May 1974. 18 p, 3 fig, 3 tab, 3 ref.

Descriptors: *Monitoring, *Nuclear powerplants, *Radioactivity, Background radiation, *Radioisotopes, Gamma rays, Environment, Air, Water, Soil, *Data collections, *Aerial sensing, *Remote sensing, Instrumentation, Aerial reconnaissance.

The Aerial Radiological Measuring System (ARMS) was used to survey the area surrounding the Millstone Nuclear Power Station during August 1969. The survey measured terrestrial background gamma radiation. A high-sensitivity detection system collected gamma-ray spectral and gross-count data. The data were then computer processed into a map of a 450-square-mile area showing isoexposure contours three feet above the ground. Exposure rates and isotopes identified are consistent with normal terrestrial background. (Houser-ORNL)
W74-10120

GROUND BASED OBSERVATIONS SUPPORTING THE SHIPPINGPORT PENNSYLVANIA, AERIAL RADIATION SURVEY OF FEBRUARY 1973.
EG and G, Inc., Las Vegas, Nev.
Available from NTIS, Springfield, Va., as Rept. No ARMS-73-6-2; $4/copy, $1.45/microfiche. Report No ARMS-73-6-2, May 1974. 18 p, 4 fig, 5 ref.

Descriptors: *Monitoring, *Assay, Measurement, *Radioactivity, *Air pollution, *Water pollution, *Soil contamination, Cesium, Sampling, *Remote sensing, Aerial sensing, Aerial reconnaissance, Soil moisture, Assessment, Snow cover.
Identifiers: Ground observations.

Soil samples and tissue-equivalent dose measurements were obtained at three ground sites beneath two aerial flight lines in the Shippingport, Pennsylvania, survey area. This work was done in support of the aerial radiological survey at Shippingport on February 24, 1973. The soil samples contained naturally occurring isotopes and Cs-137 only. The Cs-137 concentration varied from 0.46 to 0.85 picocuries per gram of dry soil. The tissue-equivalent dose measurments ranged in value from 7.8 to 9.5 micro-Rad/hr, and compare well with the gamma exposure rates measured by the Aerial Radiological Measuring System (ARMS). (Houser-ORNL)
W74-10121

SEPARATION OF CLAY MINERALS AND SOIL CLAYS USING ISOPYCNIC ZONAL CENTRIFUGATION,
Oak Ridge National Lab., Tenn.
C. W. Francis, T. Tamura, W. P. Bonner, and J. W. Amburgey, Jr.
Soil Science Society of America Proceedings, Vol 34, No 2, p 351-352, March-April 1970. 2 fig, 6 ref.

Descriptors: *Analytical techniques, *Centrifugation, *Water purification, *Water treatment, *Clays, Clay minerals, Soils, Soil density, Density, Physical properties, Research and development, Silts, Loam.
Identifiers: *Zonal centrifugation, *Density gradient, Dodge silt loam.

The technique of isopycnic-zonal centrifugation in a continuous nonaqueous density gradient was used in the purification and separation of standard clay minerals and soil clays. A suspending agent (polyvinylpyrrolidone) compatible with tetrabromoethane and ethanol stabilized clay suspensions produced multiple banding of systems which otherwise flocculated into one band. Data from x-ray diffraction analyses revealed the technique is useful in purification of clay minerals and identification of clay minerals in soil clays; however, the banding obtained from the clay fraction of a Dodge silt loam did not represent discrete bands of specific clay minerals. (Houser-ORNL)
W74-10125

BACTERIAL POLLUTION INDICATORS IN THE INTESTINAL TRACT OF FRESHWATER FISH,
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
E. E. Geldreich, and N. A. Clarke.
Applied Microbiology, Vol 14, No 3, p 429-437, May, 1966, 2 fig, 7 tab, 19 ref.

Descriptors: *Bacteria, *Freshwater fish, *Coliforms, Sampling, Temperature, *Bioindicators, *Ohio, *Streptococcus, *Pollutant identification.
Identifiers: Bacterial pollution indicators, Intestinal tract(Fish), *Little Miami River(Ohio).

A study was made of the occurrence, distribution, and persistence of coliforms, fecal coliforms, and fecal streptococci in the intestinal tract of freshwater fish. A total of 132 fish representing 14 different species were used in various phases of these experiments. Examination of the intestinal contents of 78 fish from moderately polluted sections of the Little Miami River indicated that fecal coliform densities were lowest in bluegills and highest in catfish. Levels of fecal streptococci for these two species were 220 and 240,000 per gram, respectively. The occurrence of fecal coliforms in fish caught in this stream reflected the warm-blooded-animal-pollution level of the water. All fish used were caught during July, August, and September when the water temperatures were between 13 and 18C. The fate of fecal coliforms and Streptococcus feacalis in the fish intestine indicated that these organisms can probably survive and multiply when fish and water temperatures are 20C or higher, but only when the organisms are retained in the gut for periods beyond 24 hr. (Cartmell-East Central)
W74-10131

USE OF CAISSONS FOR SAMPLING CHEMICAL AND BIOLOGICAL CONDITIONS BENEATH A BEEF FEEDLOT,
Nebraska Univ., Lincoln.
L. F. Elliott, T. M. McCalla, N. P. Swanson, and F. G. Viets, Jr.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 14, No 6, p 1018-1019, November-December, 1971. 4 fig, 2 tab, 2 ref.

Descriptors: *Feed lots, *Caissons, *Sampling, *Biological properties, *Soil chemical properties, Surface-groundwater relationships, Soil contamination, Cattle, Soil gases, Pollutant identification, Air pollution.

The caisson installation allows soil gas and soil solution to be taken from the same sites, in the feedlot soil profile, over extended periods of time. These samples provide a measure of the chemistry and biological activity under a feedlot which would be extremely difficult without the benefit of the caisson installation. The sampling equipment required for this study is delicate and requires protection from the feedlot environment. To protect the instruments, large cylindrical compartments, or caissons, equipped with access ports, are inserted into the feedlot soil profile. Values obtained

indicate the system will permit the measurement of the effect of feedlot management on the downward movement of pollutants. (Ballard-East Central)
W74-10138

DEVELOPMENT OF SAMPLE PREPARATION METHODS FOR ANALYSIS OF MARINE ORGANISMS,
Southwest Research Inst., Houston, Tex.
H. C. McKee, and D. S. Tarazi.
Copy Available from GPO Sup Doc as EP1.23:660/3-74-026, $1.05; microfiche from NTIS as PB-234 201 $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-74-026, January 1974. 59 p, 7 fig, 1 tab, 49 ref, 2 append. EPA Project 16020 EGG.

Descriptors: *Analytical techniques, *Gas chromatography, Aromatic compounds, Nitrogen compounds, Pesticides, Organic compounds, Solvent extractions, Chlorinated hydrocarbon pesticides, *Marine animals, *Pollutant identification.
Identifiers: *Sample preparation, Ketones, Phenols, Esters.

A two-year laboratory investigation has been completed to develop laboratory methods for processing, extracting, purifying, concentrating, and measuring specific organic pollutants found in marine organisms. Major conclusions are as follows: (a) Quantitative measurement of many organic contaminants is possible in the range of 0.2 to 0.5 parts per million in a 5-g sample. (b) Qualitative detection is possible at concentrations below the limit of quantitative measurement, thus providing a means of identifying the presence of organic contaminants at levels far below any known threshold of toxicity or other adverse effects for most organic compounds. (c) Compounds tested in laboratory studies included saturated hydrocarbons to C22, aromatics to C9, alcohols to C7, amines to C6, glycols to C6, unsaturated hydrocarbons to C10, as well as various ketones, phenols, esters, heterocyclic compounds, acids, sulfides, amides, and chlorinated hydrocarbons. With most of these, recovery of 70 to 90 percent of the amount present was obtained, indicating that quantitative measurements are possible within the ranges stated above. (d) Several methods of sample preparation can be used prior to analysis by gas chromatography. (e) Based on the results obtained, the analysis of almost any variety of marine specimens should be possible to measure trace organic constituents. (Hegre-EPA)
W74-10190

APPLICATION OF POLARIZATION MEASUREMENTS IN TRACING TECHNIQUES,
Rhode Island Univ., Kingston.
For primary bibliographic entry see Field 5B.
W74-10203

A CAPILLARY TUBE DIFFUSION CELL FOR MEASURING ION DIFFUSION IN AQUEOUS SOLUTIONS,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
D. A. Brown.
Soil Science Society of America Proceedings, Vol 38, No 3, p 533-535, May-June 1974. 1 fig, 1 tab, 9 ref.

Descriptors: *Diffusion, *Ion transport, *Aqueous solutions, Laboratory tests, Equipment, *Strontium radioisotopes, *Sodium, *Pollutant identification.
Identifiers: *Rubidium.

For measuring ion diffusion, a capillary tube diffusion cell unit is described with directions for its preparation and use. Self-diffusion data for Sr, Rb, and Na in single and mixed ion systems and one herbicide are reported. Values can be routinely obtained with coefficient of variations below 3%. (Knapp-USGS)
W74-10207

FISSION PARTICLE TRACKS IN MICAS AND MICACEOUS VERMICULITES AS RELATED TO CHEMICAL WEATHERING AND CATION EXCHANGE PROPERTIES,
Wisconsin Univ., Madison. Dept. of Soil Science.
S. Y. Lee, M. L. Jackson, and I. B. Sachs.
Soil Science Society of America Proceedings, Vol 38, No 3, p 423-428, May-June 1974. 5 fig, 2 tab, 25 ref.

Descriptors: *Ion exchange, *Weathering, *Radiochemical analysis, Uranium radioisotopes, Radioactive dating, Potassium, *Cation exchange, Adsorption, Leaching, Neutron activation analysis.
Identifiers: *Nuclear fission tracks, *Micas.

Weathering may be accelerated along fission particle tracks from U-238 impurities in natural micas and micaceous vermiculites. These tracks were observed by scanning electron microscopy after hydrofluoric acid etching. Track frequency was increased by neutron activation. Without HF etching, the average rate of interlayer K released from micas saturated with U02 and activated were 40 to 50% higher than that from nonactivated samples. Activated U02 saturated micaceous vermiculites liberated more K, Fe, and Si(OH) compared to controls. Weathering of micaceous minerals in nature would thus be accelerated by the additional diffusion of interlayer and structural cations through the natural fission particle tracks. The cation exchange capacity of the activated micaceous vermiculites increased from 16 to 25 meq/100g in one sample and from 6 to 12 meq/100g in another sample, while much less change occurred in controls. The observed higher K selectivity (relative to Ca) of the activated samples compared to the controls indicates that activation provided an increase in edge wedge sites for the selective adsorption of fixing cations. (Knapp-USGS)
W74-10214

RECONNAISSANCE OF WATER QUALITY IN THE VICINITY OF SUNNILAND OIL FIELD, COLLIER COUNTY, FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 5B.
W74-10240

BUREAU OF MINES ENVIRONMENTAL ACTION PROGRAMS FOR NORTHEASTERN PENNSYLVANIA--REFUSE BANK REMOVAL; SUBSIDENCE MONITORING,
MITRE Corp., McLean, Va.
R. W. Bee, R. J. Buck, W. E. Jacobsen, S. H. Lubore, and R. P. Pikul.
Washington Operations Report MTR-6165, April 1972. 559 p, 129 fig, 72 tab, 13 ref.

Descriptors: *Coal mine wastes, *Subsidence, *Water pollution control, Land subsidence, Acid mine water, Mining, Mine wastes, *Pennsylvania, Monitoring.
Identifiers: Lackawanna Valley(Penn).

All coal mine refuse banks in the Lackawanna Valley of Pennsylvania were examined by field surveys, aerial photographs, topographic maps, and the results of other investigations. A total of 80 banks, containing about 77 million cubic yards of refuse and occupying approximately 3000 acres, were identified as feasible candidates for removal. Subsurface voids of old mines are logical disposal sites. Promising systems for the detection and tracking of earth surface subsidence were evaluated. Tiltmeters are somewhat more suitable for application in open, undeveloped land; strain gages can be used advantageously in commercial type construction; and for private residences, photoelastic patches have potential application. (Knapp-USGS)
W74-10270

PRESERVATION OF SOIL SAMPLES FOR INORGANIC NITROGEN ANALYSES,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
For primary bibliographic entry see Field 2G.
W74-10334

5B. Sources Of Pollution

DISTRIBUTION OF TRACE METALS IN A WARM WATER RELEASE IMPOUNDMENT,
Quachita Baptist Univ., Arkadelphia, Ark.
For primary bibliographic entry see Field 2H.
W74-09801

A PRELIMINARY REPORT ON URBAN HYDROLOGY AND URBAN WATER RESOURCES: OAHU, HAWAII,
Hawaii Unin., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 2A.
W74-09803

AQUATIC FUNGI IN RIVERS: THEIR DISTRIBUTION AND RESPONSE TO POLLUTANTS,
Virginia Polytechnic Inst. State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W74-09810

LITTER AND SOIL MICROBIAL DYNAMICS IN A DECIDUOUS FOREST STAND,
Oak Ridge National Lab., Tenn.
B. S. Ausmus, and M. Witkamp.
Avail: NTIS, Springfield, Va., as Rept. No. EDFB-IBP-73-10; $7.60/copy, $1.45/microfiche. Report No. EDFB-IBP-73-10, February 1974. 202 p, 26 fig, 50 tab, 155 ref, 2 append.

Descriptors: *Deciduous forests, *Forest soils, *Microbial degredation, Water pollution sources, *Litter, *Hardwood, Biomass, Temperature, Carbon cycle, Carbon dioxide, Correlation analysis, Dynamics, Topography, Biomes, Ecosystems, Ecology, Aanlysis, *Tennessee.
Identifiers: Liriodendron tulipifera.

A second-growth mesic hardwood stand dominated by Liriodendron tulipifera and located near Oak Ridge, Tennessee, was the site of a study of forest floor microbial dynamics. The litter is mull type; the soil is alluvial. The area is located on karst topography. Annual soil temperatures ranged from 3 to 15C at 5 cm depth. Moisture in the forest floor is rarely less than field capacity. Some of the microbial dynamics aspects discussed are: (1) Detrital input and particle size; (2) Litter substrate quality changes; (3) Microbial biomass correlations with temperature and carbon dioxide; and (4) frequency of occurrence of microbial genera. (Houser-ORNL)
W74-09823

MODELS AND COMPUTER CODES FOR EVALUATING ENVIRONMENTAL RADIATION DOSES,
Battelle-Pacific Northwest Labs., Richland, Wash.
J. K. Soldat, N. M. Robinson, and D. A. Baker.
Avail: NTIS, Springfield, Va., as Rept. No. BNWL-1754; $7.60/copy, $1.45/microfiche. Report No. BNWL-1754, February 1974. 168 p, 3 fig, 23 tab, 22 ref, append.

Descriptors: Environment, Safety, Evaluation, Toxicity, *Radioactivity, *Model studies, *Computer models, *Computer programs, *Radioisotopes, Iodine, Tritium, Aquatic life, Food chains, Effluents, Liquids, Gases, Human population, Public health.

A simplified model for calculation of radiation doses from radioactive effluents was developed and programmed into a conversational language, providing fast turnaround time. The new model is divided into four independent parts, each written as a separate program - ARRRG: Calculates individual and population doses from liquid effluents. CRITR: Calculates internal radiation doses to four common classes of aquatic organisms and to organisms which consume them. FOOD: Calculates doses from consumption of food crops and animal products produced on irrigated farms. GRONK: Calculates doses from gaseous effluents to individuals and to the total population within 50 miles. The model can be used to calculate radiation doses to the total body and selected organs of individuals and population groups, and to organisms other than man. It includes all air and liquid exposure pathways thought to be significant and for which a reasonable amount of supporting data is available. Internal doses to man are based on a 1-year radionuclide intake, assuming no prior accumulation in the body. The radionuclide content of ingested food is assumed to be at equilibrium with the environment. The models are discussed in detail and the programs ARRRG, CRITR, and GRONK are described. The program FOOD is still being developed. (Houser-ORNL)
W74-09824

IODINE METABOLISM IN CHILDREN AND ADOLESCENTS IN AN AREA OF THE COMMUNITY,
Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 5C.
W74-09827

RADIOBIOLOGY AND RADIOECOLOGY OF FARM ANIMALS.
Atomizdat, Moscow (USSR).
For primary bibliographic entry see Field 5C.
W74-09828

PUBLICATIONS 1973.
Du Pont de Nemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
Aval: NTIS, Springfield, Va., Rept. No. DP-929, Rev 2; Suppl. 2; $4/copy, $1.45/microfiche. Report No. DP-929, Rev. 2, Supplement 2, February 1974. H. S. Hilborn, compiler.

Descriptors: *Bibliographies, *Documentation, *Publications, Research and development, Computer programs, *Nuclear energy, *Radioactivity, Air pollution, Water pollution, Soil contamination, *South Carolina.
Identifiers: Savannah River(So.Car.).

This compilation includes research and development reports, journal articles, contributions to books, computer programs, and other items published by Du Pont under its contract with the Atomic Energy Commission. The information was compiled by machine methods to produce bibliographic, subject, and author listings. This supplement updates the information included in DP-929, Rev. 2, Publications, 1951 through 1971, and DP-929, Rev. 2, Supplement 1, Publications, 1972 to include 1973. The bibliographic listing is arranged alphabetically by the first-mentioned author of each publication. The listing includes an identifying code number derived from the author's name, the publication date, and the title. The subject listing is arranged alphabetically by key word in context (KWIC) indexing of the titles. The listing includes the identifying code number to cross reference the subject and bibliographic listings. The author listing includes in alphabetical order all authors, coauthors, editors, and compilers with identifying code number, for all publications on which their names appear. (Houser-ORNL)
W74-09832

TRACE ELEMENT MEASUREMENTS AT THE COAL-FIRED ALLEN STEAM PLANT - PROGRESS REPORT, JUNE 1971 TO JANUARY 1973,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5A.
W74-09833

NSF-RANN TRACE CONTAMINANTS ABSTRACTS.
Oak Ridge National Lab., Tenn. Toxic Materials Information Center.
For primary bibliographic entry see Field 5A.
W74-09835

DISTRIBUTION AND RELEASE OF TRITIUM IN HIGH-TEMPERATURE GAS-COOLED REACTORS AS A FUNCTION OF DESIGN, OPERATIONAL, AND MATERIAL PARAMETERS,
Oak Ridge National Lab., Tenn.
E. L. Compere, S. H. Freid, and C. W. Nestor.
Aval: NTIS, Springfield, Va., as Rept. No. ORNL-TM-4303; $5.45/copy, $1.45/microfiche. Rept No. ORNL-TM-4303, June 1974. 97 p, 1 fig, 2 tab, 24 ref, 3 append.

Descriptors: *Tritium, *Productivity, *Nuclear powerplants, *Effluents, Computer program, Forecasting, Assessment, Streams, Water pollution, Environmental effects, Equations, Public health, *Nuclear reactors.

Tritium will be produced in high-temperature gas-cooled reactors not only by fission, but also to a significant extent by reactions of neutrons with boron in burnable poison and control rods, with trace lithium impurity, and with He-3 occurring naturally in the helium coolant flowing through the core. A portion of the tritium that is formed in solids or fuel may be released to the coolant. This tritium mingles with the hydrogen in the coolant and will, in part, chemisorb on graphite. In addition, it may leak with the coolant from the reactor vessel, be removed in the helium purification system, or permeate system walls into the steam generator, where as a result of removal (blowdown) or losses it is subject to release to the environment. The differential equations describing the above behavior are developed. Assumption of steady conditions, including hydrogen concentration, for a period makes it possible to express the distribution as well as the production in the form of coupled sets of linear first-order ordinary differential equations. A generalized analytical solution of these is presented. (Houser-ORNL)
W74-09838

ENVIRONMENTAL MONITORING AT MAJOR U.S. ATOMIC ENERGY COMMISSION CONTRACTOR SITES, CALENDAR YEAR 1972.
Division of Operational Safety (AEC), Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-09840

ENVIRONMENTAL MONITORING AND POLLUTANT INVENTORY PROGRAM REPORT FOR PANTEX PLANT (AMARILLO, TEXAS), COVERING CALENDAR YEAR 1972.
Mason and Hanger - Silas Mason Co., Inc., Amarillo, Tex.
For primary bibliographic entry see Field 5A.
W74-09841

ENVIRONMENTAL MONITORING REPORT, 1972, PINELLAS PLANT, ST. PETERSBURG, FLORIDA.
General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.
For primary bibliographic entry see Field 5A.
W74-09842

ANNUAL ENVIRONMENTAL MONITORING REPORT - ROCKY FLATS PLANT, (COLORADO), JANUARY THROUGH DECEMBER, 1972,
Dow Chemical Co., Golden, Colo. Rocky Flats Div.
For primary bibliographic entry see Field 5A.
W74-09843

ENVIRONMENTAL REPORT FOR CALENDAR YEAR 1972 ON RADIOLOGICAL AND NON-RADIOLOGICAL PARAMETERS, (BATTELLE COLUMBUS LABORATORIES, OHIO).
Battelle Columbus Lab., Ohio. Health Physics Services.
For primary bibliographic entry see Field 5A.
W74-09844

1972 ENVIRONMENTAL MONITORING REPORT - BROOKHAVEN NATIONAL LABORATORY, (NEW YORK).
Brookhaven National Lab., Upton, N.Y.
For primary bibliographic entry see Field 5A.
W74-09845

ENVIRONMENTAL MONITORING REPORT OF THE LACROSSE BOILING WATER REACTOR (WISCONSIN) FROM JANUARY 1, 1971 TO DECEMBER 31, 1972.
Dairyland Power, Cooperative, LaCrosse, Wis.
For primary bibliographic entry see Field 5A.
W74-09846

ENVIRONMENTAL MONITORING REPORT FOR CALENDAR YEAR 1972 FOR THE NATIONAL ACCELERATOR LABORATORY, BATAVIA, ILLINOIS,
National Accelerator Lab., Batavia, Ill.
For primary bibliographic entry see Field 5A.
W74-09847

1972 NATIONAL REACTOR TESTING STATION ENVIRONMENTAL MONITORING PROGRAM REPORT, (IDAHO FALLS, IDAHO).
Idaho Operations Office (AEC), Idaho Falls. Health Services Lab.
For primary bibliographic entry see Field 5A.
W74-09848

EFFLUENT AND ENVIRONMENTAL MONITORING REPORT FOR CALENDAR YEAR 1972 FOR THE BETTIS ATOMIC POWER LABORATORY, (PITTSBURGH, PENNSYLVANIA).
Bettis Atomic Power Lab., Pittsburgh, Pa.
For primary bibliographic entry see Field 5A.
W74-09849

KNOLLS ATOMIC POWER LABORATORY (SCHENECTADY, NEW YORK) ANNUAL ENVIRONMENTAL MONITORING REPORT CALENDAR YEAR 1972.
Knolls Atomic Power Lab., Schenectady, N.Y.
For primary bibliographic entry see Field 5A.
W74-09850

ANNUAL EFFLUENT DATA AND ENVIRONMENTAL MONITORING REPORT OF THE SHIPPINGPORT ATOMIC POWER STATION, (PENNSYLVANIA).
Duquesne Light Co., Shippingport, Pa.
For primary bibliographic entry see Field 5A.
W74-09851

ENVIRONMENTAL MONITORING REPORT FOR THE NEVADA TEST SITE AND OTHER TEST AREAS USED FOR UNDERGROUND NUCLEAR DETONATIONS - JANUARY-DECEMBER 1972.
National Environmental Research Center, Las Vegas, Nev.

For primary bibliographic entry see Field 5A.
W74-09852

FEED MATERIALS PRODUCTION CENTER (CINCINNATI, OHIO) ENVIRONMENTAL MONITORING ANNUAL REPORT FOR 1972.
National Lead Co. of Ohio, Cincinnati.
For primary bibliographic entry see Field 5A.
W74-09853

ENVIRONMENTAL MONITORING REPORT - UNITED STATES ATOMIC ENERGY COMMISSION - OAK RIDGE FACILITIES, CALENDAR YEAR 1972.
Oak Ridge Gaseous Diffusion Plant, Tenn.
For primary bibliographic entry see Field 5A.
W74-09854

ENVIRONMENTAL MONITORING REPORT - UNITED STATES ATOMIC ENERGY COMMISSION - PADUCAH GASEOUS DIFFUSION PLANT (KENTUCKY) - CALENDAR YEAR 1972.
Paducah Gaseous Diffusion Plant, Ky.
For primary bibliographic entry see Field 5A.
W74-09855

PORTSMOUTH GASEOUS DIFFUSION PLANT (OHIO) ENVIRONMENTAL MONITORING REPORT - 1972,
Goodyear Atomic Corp., Piketon, Ohio.
For primary bibliographic entry see Field 5A.
W74-09856

ANNUAL ENVIRONMENTAL MONITORING REPORT 1972 - LAWRENCE BERKELEY LABORATORY, (CALIFORNIA),
California Univ., Berkeley. Lawrence Berkeley Lab.
For primary bibliographic entry see Field 5A.
W74-09857

ANNUAL ENVIRONMENTAL MONITORING REPORT OF STANFORD LINEAR ACCELERATOR CENTER (CALIFORNIA) - JANUARY-DECEMBER 1972,
Stanford Linear Accelerator Center, Calif.
For primary bibliographic entry see Field 5A.
W74-09858

ENVIRONMENTAL MONITORING IN THE VICINITY OF THE SAVANNAH RIVER PLANT (SOUTH CAROLINA) - ANNUAL REPORT FOR 1972.
Du Pont de Nemours (E.I.) and Co., Aiken, S. C.
For primary bibliographic entry see Field 5A.
W74-09859

WATER MOTION AND WATER-SEDIMENT INTERACTION,
Scripps Institution of Oceanography, La Jolla, Calif.
D. Inman, D. Swift, D. Duane, J. Smith, and G. Gross.
In: Offshore Nuclear Power Siting Workshop, Report No WASH-1280, p 1-15, (1973). 38 ref.

Descriptors: *Nuclear powerplants, *Sites, *Offshore platforms, Movement, Water pollution, *Sediments, Nuclear reactors, Effluents, Oceans, Meteorology, Topography, Structural stability, Oceanography, Sediment transport, Path of pollutants, Radioactivity, Discharge(Water), Food chains, Public health, Breakwaters, Basins.

Discussed are problems concerned with water motion and the water-sediment interactions that occur over the continental shelf and are thought to be important to environmental considerations of the contemplated offshore power systems, their effluents, and their protective structures. The important processes that operate in the nearshore water of all oceans appear to be similar in kind. They differ mainly in intensity and scale, variables which are determined by the energy in the driving forces such as winds and currents, and by the physical dimensions and topography of the nearshore zone. With these concepts in mind, the general approach was to identify the important processes, and their likely interactions with the proposed structures and effluents. Where possible, the present state of understanding and the availability of data are indicated. Each item requiring additional research is categorized. The processes and interactions were discussed under four major headings: (A) Physical Oceanography; (B) Water-Sediment Interface and Sediment Transport Paths; (C) Power Plant Intake and Discharge; and (D) Detached Breakwater and Basin. (See also W74-09862) (Houser-ORNL)
W74-09863

BIOLOGICAL ASPECTS OF OFFSHORE NUCLEAR POWER PLANTS,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5C.
W74-09864

FALLOUT PROGRAM--QUARTERLY SUMMARY REPORT, SEPTEMBER 1, 1973, THROUGH DECEMBER 1, 1973,
Health and Safety Lab. (AEC), New York.
For primary bibliographic entry see Field 5A.
W74-09869

FALLOUT PROGRAM--QUARTERLY SUMMARY REPORT--JANUARY 1, 1973, THROUGH DECEMBER 1, 1973, APPENDIX,
Health and Safety Lab. (AEC), New York.
For primary bibliographic entry see Field 5A.
W74-09870

POSSIBLE EFFECTS OF IONIZING RADIATION UPON MARINE LIFE AND SOME IMPLICATIONS OF POSTULATED ACCIDENTAL RELEASES OF RADIOACTIVITY,
California Univ., Los Angeles. Office of Environmental Science and Engineering.
For primary bibliographic entry see Field 5C.
W74-09871

POPULATION DOSES FROM THE NUCLEAR INDUSTRY TO 2000 A.D.
For primary bibliographic entry see Field 5C.
W74-09872

RADIOACTIVE FALLOUT IN AIR AND RAIN: RESULTS TO THE MIDDLE OF 1973,
Atomic Energy Research Establishment, Harwell (England).
R. S. Cambray, E. M. R. Fisher, A. Parker, and D. H. Peirson.
Available from NTIS, Springfield, Va., as Rept No AERE-R-7540. Report No AERE-R-7540, December 1973. 45 p, 7 fig, 30 tab, 33 ref.

Descriptors: *Radioactivity, *Fallout, *Monitoring, Radioisotopes, Cesium, Strontium, Air pollution, Water pollution, Water pollution sources, Nuclear explosions, Sampling, Environment, Environmental effects, Rain, Rainfall deposition, Assay, Assessment, Toxicity, Public health, Forecast.
Identifiers: *United Kingdom, China, France, Worldwide deposition.

Samples of atmospheric dust and rainwater have been collected from the United Kingdom and elsewhere. Results are presented of analyses of these samples for various fission products and certain other radionuclides. The average concentrations of the long-lived fission products caesium-137 and strontium-90 were, in the first six months of 1973, less than half those for the first six months of 1972 and less than 2% of the maximum which was reached in 1963/64. Fresh activity from the yield Chinese explosion of 27 June 1973 was detected in the United Kingdom in July. The low yield French test series of July and August 1973 has had negligible effect upon the levels of long-lived fission products near the ground. An estimate is made of the worldwide deposit of Cs-137 and Sr-90 in rain to the end of 1972; the cumulative deposit has remained substantially constant since 1966. About three-quarters of the total long-lived activity has been deposited in the northern hemisphere. The gamma and beta-ray dose rates in air from fallout at Chilton are estimated from the observed deposition. (Houser-ORNL)
W74-09876

INVESTIGATION AND EVALUATION OF 102-BX TANK LEAK,
Atlantic Richfield Hanford Co., Richland, Wash. Engineering Dept.
J. C. Womack, and D. J. Larkin.
Available from NTIS, Springfield, Va., as Rept No ARH-2035; $4/copy, $1.45/microfiche. Report No ARH-2035, March 1971. 18 p, 5 fig, 2 tab, 8 ref.

Descriptors: *Radioactive waste disposal, *Monitoring, *Waste storage, *Leakage, Radioactivity, Cesium, Assay, Assessment, Safety, Evaluation, Soil contamination, Water pollution, Groundwater, Hazard, Public health, Standards, Regulation, Ion transport, Movement.
Identifiers: *Storage container.

Since 1943, 151 waste tanks located in 13 tank farms have been constructed at Hanford. To date, leaks have been confirmed in eleven tanks located in four of the farms, and six other tanks are suspected leakers. Inventory data from the suspect tanks indicated relatively small losses of liquid waste, and in some cases radioactivity had been noted in adjacent monitoring wells. All suspect as well as leaking tanks have been removed from service. One of these suspected leaking tanks is 241-BX-102. Findings are reported of a field investigation to determine if radioactive wastes had indeed leaked from this tank, and if so, estimate the volume lost and extent of waste liquid movement through the soil. Based on analyses of liquid level history, test well radiation profiles and soil sampling and analyses, tank 102-BX has been confirmed as a leaker. The most probable explanation of the tank 102-BX leak is given. (Houser-ORNL)
W74-09877

RADIOLOGICAL MONITORING PROGRAM--PERIOD COVERING MAY 17, 1973, THRU JULY 31, 1973, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Sante Fe, N.Mex. Santa Fe Lab.
Available from NTIS, Springfield, Va., as Rept No PNE-RB-51-6; $4/copy, $1.45/microfiche. Report No PNE-RB-51-6, 1973. 21 p, 14 tab, 3 ref.

Descriptors: *Nuclear explosions, *Secondary recovery(Oil), *Natural gas, *Radioactivity, *Surveys, Assay, Air pollution, Water pollution, Environmental effects, Radioactivity effects, Background radiation, Tritium, Food chains, Public health.
Identifiers: Stimulation, Beta radioactivity, Gamma radioactivity.

Beta radioactivity in air particulate samples for May 17, 1973 through July 31, 1973 remained at very low concentrations, ranging from 0.01 to 0.07 pCi/m(3). These values are consistent with values observed and reported by the Environmental Protection Agency (EPA) Air Surveillance Network and are no higher than for previous periods. Gamma scans of the air particulate samples

(composite) indicated that the concentrations of gamma emitters were below the minimum sensitivity of the 4-in. diameter times 4-in. thick NaI(Tl) detector. TLD data for this period indicated an average background radiation dose rate of 2.8 millirem per week. This is consistent with the dose rate measured in 1972. Beta radioactivity in surface water ranged from 0.0 to 8.3 pCi/l. These results were in agreement with other data obtained by Eberline. Tritium concentrations were less than 1.0 pCi/ml, concentrations measured by electrolytic enrichment being in the range of 0.1 to 0.6 pCi/l. Gamma scans indicated no detectable activity above background and system sensitivity. Gamma isotopic (GeLi) analysis of milk indicated no significant concentration of gamma emitters except natural K-40. (Houser-ORNL)
W74-09878

INVESTIGATION OF SOME FACTORS IN THE BIOCHEMICAL CONVERSION OF HG POLLUTANTS TO TOXIC METHYL HG EFFECTED BY MICROORGANISMS IN A MARINE SEDIMENT,
Naval Academy, Annapolis, Md.
M. McKinney.
Available from NTIS, Springfield, Va., as AD-749 674; $5.45 in paper copy, $0.95 in microfiche. Report USNA-TSPR-32, May 1972. 89 p, 157 ref.

Descriptors: *Mercury, *Reviews, *Environmental effects, *Estuarine environment, *Bibliographies, Food chains, Public health, Path of pollutants, Sediments, Analytical techniques, Aquaria, Physichemical properties, Bacteria, Training.

The literature on environmental Hg is reviewed, and aquaria experiments conducted to study the conversion of inorganic Hg in sediments to methyl Hg are described. Methyl Hg produced in sediment was loosely bound and was dispersed into the water by stirring the water in the aquarium. Methyl Hg was determined by gas chromatography, with a sensitivity of 50 ng/g sediment. (Bopp-ORNL)
W74-09879

RADIOACTIVE WASTE MANAGEMENT INFORMATION: 1972 SUMMARY AND RECORD-TO-DATE.
Idaho Operations Office (AEC), Idaho Falls.
Available from NTIS, Springfield, Va., as Rept No IDO-10054; $3.25/copy, $1.45/microfiche. Report No IDO-10054, 1972. 21p.

Descriptors: *Monitoring, *Radioactive waste disposal, *Idaho, *Radioisotopes, Waste treatment, Waste storage, Transportation, Administrative agencies, Nuclear reactors, Effluents, Water pollution, Data collections.
Identifiers: National Reactor Testing Station(Idaho).

Radioactive waste records associated with activities at the National Reactor Testing Station for 1972 are summarized. Summary data since 1952 are included. The volumes, radioactivity, isotopic identity, origin of waste, and decay data are given. The waste data have been taken from the NRTS Waste Management Information System. The record-to-date information has been previously reported in various documents. This information has been condensed and presented herein as a comprehensive summary of the radioactive wastes discharged to the environment from operations performed at the NRTS. In the review of the data prior to 1970, several apparent discrepancies were satisfactorily resolved. Also, recent declassification of some data permitted updating of past years' discharges. (Houser-ORNL)
W74-09880

MODELING FLOW AND CHEMICAL QUALITY CHANGES IN AN IRRIGATED STREAM-AQUIFER SYSTEM,
Geological Survey, Lakewood, Colo.
L. F. Konikow, and J. D. Bredehoeft.
Water Resources Research, Vol 10, No 3, p 546-562, June 1974. 25 fig, 3 tab, 30 ref.

Descriptors: *Water quality, *Groundwater movement, *Path of pollutants, *Return flow, *Numerical analysis, Surface-groundwater relationships, Unsteady flow, Mathematical models, Alluvial channels, Dissolved solids, Conjunctive use, *Colorado.
Identifiers: *Arkansas River(Colo).

Salinity increases in groundwater and surface water in the Arkansas River valley of southeastern Colorado are primarily related to irrigation practices. A digital computer model was developed to predict changes in dissolved solid concentration in response to spatially and temporally varying hydrologic stresses. The equations that describe the transient flow of groundwater and the transport and dispersion of dissolved chemical constituents were solved numerically. The model simulated flow as well as changes in water quality for both the stream and the aquifer. Detailed field measurements made for a 1-yr period in an 11-mi reach of the valley between La Junta and the Bent-Otero county line were used to verify and calibrate the model. Measured water levels varied by an average of about 3 ft during the study period, and calculated water table elevations in the aquifer were within 1 ft of the observed values approximately 90% of the time. The specific conductances of water samples from five wells in one well field had a standard deviation of about 10% of the mean. Dissolved solid concentrations calculated by the model were within 10% of the observed values for both the aquifer and the stream approximately 80% of the time. (Knapp-USGS)
W74-09883

OCCURRENCE OF DISSOLVED ORGANIC CARBON IN SELECTED GROUND-WATER SAMPLES IN THE UNITED STATES,
Geological Survey, Denver, Colo.
J. A. Leenheer, R. L. Malcolm, P. W. McKinley, and L. A. Eccles.
Journal of Research of the U S Geological Survey, Vol 2, No 3, p 361-369, May-June 1974. 3 tab, 4 ref.

Descriptors: *Organic matter, *Groundwater, Water quality, Water chemistry, Sampling, Water analysis, Chemical analysis, Alkalinity, Aquifer characteristics.
Identifiers: Dissolved organic carbon.

Nonvolatile DOC (dissolved organic carbon) in groundwater was studied to establish base levels of naturally occurring dissolved organic materials. Samples of groundwater were obtained at 100 sites in 27 states. Samples were pressure filtered at the time of collection and immediately frozen on dry ice. DOC concentrations were determined by wet oxidation of organic carbon to carbon dioxide which was measured by an infrared analyzer. The DOC concentrations ranged from less than the 0.1 mg/liter limit of detection to 15 mg/liter. Concentrations of DOC were directly correlated with specific conductance and alkalinity, but did not correlate with pH. The DOC mean concentration was 1.2 mg/liter; however, the DOC median value was lower at 0.7 mg/liter. Differences in DOC concentrations for various types of consolidated rock aquifers were slight; for example, median DOC values for sandstone, limestone, and crystalline rock aquifer types ranged from 0.5 to 0.7 mg/liter. No difference was found in the median DOC concentration between shallow (less than 200 ft; 61 m) and deep (greater than 200 ft) sand and gravel aquifers. (Knapp-USGS)
W74-09917

HEAT TRANSFER MODELS FOR A SUBSURFACE, WATER PIPE, SOIL-WARMING SYSTEM,
Arkansas Univ., Fayetteville. Dept. of Chemical Engineering.
J. H. Kendrick, and J. A. Havens.
Journal of Environmental Quality, Vol 2, No 2, p 188-196, April-June 1973. 12 fig, 6 tab. OWRR A-014-ARK (1).

Descriptors: *Recycling, *Thermal pollution, *Heat transfer, *Soils, Heat flow, Mathematical models, Water pollution control, Pollution abatement, Cooling water, Powerplants.
Identifiers: Waste heat, Soil heating.

Mathematical models are presented for the prediction of heat losses from subsurface pipes carrying hot water. The method of images is used to calculate the heat loss from a hot water pipe buried at a given depth below the surface of a homogeneous soil with a constant soil surface temperature. The heat loss is described as a function of the difference between the temperature of the soil surface. The energy balance is used to determine the longitudinal temperature distribution of the water. The method is extended to describe the heat loss and the longitudinal temperature distribution for a system of equally spaced, parallel, subsurface pipes with water flowing in the same direction in neighboring pipes. The method is extended to calculate the heat loss and the longitudinal temperature distribution for a system of equally spaced, parallel, subsurface pipes with water flowing in opposite directions in neighboring pipes. Soil temperature profiles around the buried pipes are calculated. The models may be used to calculate the land area which can be heated with an underground piping system carrying the cooling water from the condensers of a 1000-megawatt nuclear-powered steam generation electric power plant. (Knapp-USGS)
W74-09921

SIMULATION MODEL TO STUDY THE UTILIZATION OF WASTE HEAT USING A COMBINATION MULTIPLE RESERVOIR AND GREENHOUSE COMPLEX,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-09925

GROUND WATER POLLUTION FROM SUBSURFACE EXCAVATIONS: PART IV. MORE ON POLLUTION FROM WELLS.
Water Well Journal, Vol 28, No 7, p 51-54, July 1974. 1 tab.

Descriptors: *Waste disposal wells, *Water pollution sources, *Injection wells, Monitoring, Water pollution control, Path of pollutants, Aquifer characteristics, Waste water disposal.

A foremost consideration in evaluating the feasibility of waste injection is the character of the waste. The suitability of waste for subsurface injection depends on its volume and physical and chemical properties of the potential injection zones and their interstitial fluids. Optimal use of underground storage space will be realized by use of well injection only where (1) more satisfactory alternative methods of waste treatment and disposal are not available, and (2) minimization of injected-waste volumes is achieved through good waste management. Knowledge of the mineralogy of the aquifer and the chemistry of interstitial fluids and waste should indicate the reactions to be anticipated during injection. Common minerals that react significantly with wastes are the acid soluble carbonate minerals and the clay minerals. Well-head pressure and waste injection rate should be continuously measured. If injection tubing is used, the casing-tubing annulus should be pressure monitored. Other types of monitoring include measurement of the physical, chemical, and

biological character of injected fluids on a periodic or continuous basis, and periodic checking of the casing and tubing for corrosion, scaling, or other defects. Changes in the quality of water in springs, water supply wells, streams and lakes may also be monitored to detect effects from waste disposal wells. (Knapp-USGS)
W74-09929

MEASUREMENT AND MANAGEMENT ASPECTS OF WATER TOXICOLOGY: THE MALIBU WATERSHED A MIXED RESIDENTIAL AND WILDNESS AREA,
California Univ., Los Angeles. School of Public Health.
E. S. Flowers.
Available from the National Technical Information Service as PB-233 926 $3.75 in paper copy, $1.45 in microfiche. Completion Report, May 1974, California Water Resources Center, Davis. 48 p, 9 fig, 11 tab, 11 ref, (Univ. of Calif. Water Resources Center Project UCAL-WRC-W-330). OWRR-A-038-CAL (3).

Descriptors: *Watershed management, *Water quality, *California, Watersheds(Basins), *Baseline data, Evaluation, Planning, *Toxicity, Measurement, Data collections.
Identifiers: *Malibu watershed(Calif), *Residential-wilderness areas.

The Malibu Watershed was selected as a particularly suitable area for the study of toxic substances and their possible influences on water quality and beneficial uses of the region. The collection of data on water quality, vegetation, possible environmental interactions occurring between wilderness and residential areas, land use and general geographical characteristics of the Malibu Creek drainage area has been useful in providing opportunities for training of students in evaluation and planning aspects of water quality, while the information developed in the project has provided baseline data for future studies. The objectives were to determine water quality in the Malibu Watershed, to evaluate possible influences resulting from the introduction or removal of toxic substances, and to provide training in watershed management, planning, and protection. (Snyder-California, Davis)
W74-09950

LAKE MICHIGAN,
For primary bibliographic entry see Field 5C.
W74-09953

LAKE ERIE,
For primary bibliographic entry see Field 5C.
W74-09954

PUGET SOUND,
For primary bibliographic entry see Field 5C.
W74-09955

SAN FRANCISCO BAY,
For primary bibliographic entry see Field 5C.
W74-09956

LONG ISLAND SOUND,
For primary bibliographic entry see Field 5C.
W74-09957

HUDSON RIVER,
For primary bibliographic entry see Field 5C.
W74-09958

THE LOWER MISSISSIPPI,
For primary bibliographic entry see Field 5C.
W74-09959

SAVANNAH RIVER,
For primary bibliographic entry see Field 5C.
W74-09960

THE EFFECTS OF INCREASED PRODUCTION ON THE OCEANS,
For primary bibliographic entry see Field 5C.
W74-09963

SUMMARY OF FINDINGS CONCERNING WATER,
For primary bibliographic entry see Field 5C.
W74-09964

SANITARY LANDFILL,
Army Construction Engineering Research Lab., Champaign, Ill.
For primary bibliographic entry see Field 5E.
W74-10018

DEVELOPMENT OF A MONITOR FOR RECYCLE OF WASTE WATER,
Amicon Corp., Lexington, Mass.
For primary bibliographic entry see Field 5D.
W74-10037

THE PUDSEY PROJECT,
For primary bibliographic entry see Field 5D.
W74-10041

THE EFFECT OF A CHEMICAL METHOD FOR GAUGING DISCHARGE ON THE INVERTEBRATES OF A MOUNTAIN RIVER, (IN FRENCH),
Paul Sabatier Univ., Toulouse (France). Lab. of Hydrobiology.
For primary bibliographic entry see Field 7B.
W74-10048

SAVING A DYING SEA. THE LONDON CONVENTION ON OCEAN DUMPING,
For primary bibliographic entry see Field 6E.
W74-10065

ACQUISITION OF INFORMATION FROM OWNERS AND OPERATORS OF POINT SOURCES SUBJECT TO NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10069

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM--PROPOSED FORMS AND GUIDELINES ACQUISITION OF INFORMATION FROM OWNERS AND OPERATORS OF POINT SOURCES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10073

CONCENTRATION AND DISTRIBUTION OF TRACE ELEMENTS IN THE MAUMEE RIVER BASIN, OHIO, INDIANA AND MICHIGAN,
Ohio State Univ., Columbus. Dept. of Geology and Mineralogy.
W. A. Pettyjohn, L. R. Hayes, and T. R. Schultz.
Available from the National Technical Information Service as PB-234 013, $5.75 in paper copy, $1.45 in microfiche. Ohio Water Resources Center, Columbus, Completion Report No 396X, March 1974. 176p, 67 fig, 16 tab, 106 ref, 2 append. OWRR A-026-OHIO(1).

Descriptors: Trace elements, *Sediments, Water quality, *Heavy metals, Water supply, *Ohio, Michigan, Indiana, Aluminum, Arsenic, Cadmium, Cobalt, Chromium, Copper, Mercury, Nickel, Lead, Strontium, Zinc, *Distribution, *Path of pollutants, *Spectrophotometry, *Pollutant identification, Water pollution sources.
Identifiers: Silver, Tin, *Maumee River basin(Ohio-Mich-Ind), Atomic absorption spectrophotometry.

During the period 1971-1973, water and stream-bottom sediment samples were collected from 225 sites distributed throughout the Maumee River Basin, which lies largely in Ohio. The samples were examined by atomic absorption methods in order to determine concentrations of Ag, Al, Cd, Co, Cr, Cu, Hg, Ni, Pb, Sn, Sr, and Zn. The concentration of these elements in both water and sediment included a wide range, but in most cases the concentrations in water are very small while in sediment they may be very large. Seven municipalities in the basin are characterized by large concentrations of one or more elements in water or sediment, probably resulting from industrial and municipal waste disposal. A large number of samples from small streams in rural areas contained high concentrations of As, Hg, Pb, Ni, and Zn. These may be related to natural causes and the agricultural use of pesticides. Some high concentrations, such as As, Hg, and Sn, may be more apparent than real due to instrument error and analytical techniques.
W74-10084

WATER IS WHERE YOU FIND IT,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 8B.
W74-10094

ENVIRONMENTAL RADIOACTIVITY ANNUAL REPORT, 1972.
National Radiation Lab., Cristchurch, (New Zealand).
For primary bibliographic entry see Field 5A.
W74-10112

RETENTION OF RADIONUCLIDES DEPOSITED IN THE CHALK RIVER NUCLEAR LABORATORIES WASTE MANAGEMENT AREAS,
Atomic Energy of Canada Ltd., Chalk River (Ontario). Chalk River Nuclear Labs.
W. F. Merritt, and C. A. Mawson.
Available from Atomic Energy of Canada, Ltd., Chalk River, Ontario, as Rept. No. AECL-4510; $0.50/copy. Atomic Energy of Canada Limited, Report No. AECL-4510, September 1973. 7 p, 3 fig, 1 tab, 7 ref.

Descriptors: *Radioactive waste disposal, *Sites, *Groundwater movement, Baseflow, *Water pollution, *Retention, Climatology, Streams, Soil contamination, Ion exchange, Water table, *Canada.
Identifiers: Perch Creek, Ottawa River, Waste management.

Records are presented of the amounts of radionuclides deposited in engineered enclosures and directly into the ground in the waste management areas of the Chalk River Nuclear Laboratories up to the end of 1972. About 5.2 MCi of long-lived radionuclides, mainly in the form of stored reactor fuel, have been placed in engineered facilities and about 32 kCi have been deposited directly into the ground. Any radionuclides escaping into public waters from this system must pass down Perch Creek into the Ottawa River. The total run-off down Perch Creek over the whole period was 13 Ci. The Chalk River site has therefore proved to be very effective in retaining radionuclides in spite of the low ion-exchange capacity of the soil and conditions of climate and water table height that make it less than ideal for radioactive waste management. (Houser-ORNL)
W74-10118

PERCOL USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resource Dept.
R. J. Serne, and R. C. Routson.
Available from NTIS, Springfield, Va., as Rept. No. BNWL-1720; $5.45/copy, $1.45 microfiche. Report No. BNWL-1720, 1973. 75 p, 1 fig, 6 ref, 3 append.

Descriptors: *Model studies, *Radioactive waste disposal, Effluents, *Leakage, *Soil contamination, *Water pollution, Path of pollutants, Radioisotopes, Movement, Ion transport, Transfer, Ion exchange, Computer program, *Washington.
Identifiers: Hanford Site(Wash).

Research being conducted under the Radionuclides in Soils Program is attempting to predict the distribution and movement of liquid wastes in the heterogeneous subsurface environment of the Hanford Reservation. As part of this program, a transport model is being developed to predict chemical phenomena in soil-waste reactions. This document describes the use of the PERCOL model, which was developed as a simplified one-dimensional precursor to the transport model. PERCOL numerically describes the complex chemical reactions which occur during percolation of a waste solution through a porous media. This User's Manual describes the main program (PERCOL) and two subroutines (NEWTIT and DIST) and gives procedures for accessing these programs, inputting data to them and interpreting the output. (Houser-ORNL)
W74-10123

FAILURE OF 307 BASIN TRANSFER LINE AND RESULTANT GROUND CONTAMINATION,
Battelle-Pacific Northwest Lab., Richland, Wash.
D. H. Dehnam.
Available from NTIS, Springfield, Va., as Rept No BNWL-CC-2617; $4/copy, $1.45/microfiche. Report No BNWL-CC-2617, 1970. 26 p, 7 fig, 2 tab, 4 ref, 2 append.

Descriptors: *Leakage, *Strontium, *Cesium, *Underground waste disposal, *Corrosion, *Pipelines, Soil contamination, Water pollution, Accidents, Hazards, Safety, Evaluation, Assessment, Monitoring, Radioactivity, *Washington.
Identifiers: *Hanford Site(Wash).

Approximately 900 curies of relatively short-lived radionuclides, including 10 curies each of Sr-90 and Cs-137 inadvertently leaked to the soil as a result of the corrosion of an undergound carbon steel pipe section. Greater than 90% of the contamination from this incident is confined within a cylindrical section of earth approximately 25 feet deep and 12 feet in diameter. Despite the fact that promethium and cerium were combined with complexing agents, both were substantially retained by the soil. Any groundwater contamination from this incident was minimal, because no 300 Area groundwater samples showed detectable concentrations of the nuclides found in the soil. Since the leak existed for some time (longer than a year), any further migration of the activity from its sorbed position in the soil should be negligible. (Houser-ORNL)
W74-10127

AMMONIA VOLATILIZATION AND NITROGEN TRANSFORMATIONS IN HIGH PH SOILS USED FOR BEEF MANURE DISPOSAL,
Corps of Engineers, Vicksburg, Miss.
R. E. Peters, and D. L. Reddell.
Paper No 73-428, presented at the Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973, 31 p, 8 fig, 9 tab, 24 ref.

Descriptors: *Ammonia, *Volatility, *Hydrogen ion concentration, Nitrogen, *Soils, *Sampling, Denitrification, *Farm wastes, Cattle, Feed lots, Carbon dioxide, Lime, Chemical properties, Fertilizers, *Texas.
Identifiers: *Nitrogen transformations, Tabor loamy fine sand, Carbonates.

Eighteen soil columns were used to study ammonia volatilization and nitrogen transformations in soils receiving manure applications. Three of both limed (pH=12.0) and unlimed (pH=7.5) soil columns were evaluated after 30, 60, and 90 days treatments. More NH3 was evolved from the limed soils than from the unlimed soils. CO2 production was greater in unlimed soils. Final chemical analasis of soils revealed 10% and 20% losses in nitrogen from limed and unlimed soils respectively. These nitrogen losses were greater in the upper 30 cm. of the soil columns. Nitrogen losses from the limed columns were believed to be by nitrification and then denitrification. (Frantz-East Central)
W74-10143

THE PERFORMANCE OF PRIMARY SETTLING ON LIVESTOCK FEEDLOT RUNOFF,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10146

QUALITY DEGRADATION OF DAIRY WASHWATER,
California Univ., Riverside.
A. C. Chan, G. Yamashita, J. B. Johanson, K. Aref, and D. C. Baier.
Paper No 73-440 presented at the Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973, 21 p, 5 fig, 5 tab.

Descriptors: *Quality control, *Degradation(Decomposition), *Dairy industry, *Groundwater pollution, *Farm wastes, Cattle, Waste disposal, Effluent, Chemical properties, Physical properties, Nitrogen, Salts, Chemical oxygen demand, Waste water(Pollution), Return flow, *California.

Representative samples from twenty-five dairies, divided into five groups according to size, were evaluated for quality degradation of dairy washwater. The water supply was totally dependent upon the underground source. The physical and chemical properties of wastewater were compared with those of the water used before washing. The greatest increase was in chemical oxygen demand, total nitrogen and total dissolved salts. The increment was at least 4-5 times higher than that in water used for domestic purposes. Removal of nitrogen and dissolved salts is the major concern for making water suitable for land disposal. (Frantz-East Central)
W74-10147

ON THE COMBINED TREATMENT OF DOMESTIC SEWAGE AND WASTE WATER FROM WOOD INDUSTRIES,
Oulu Univ. (Finland).
For primary bibliographic entry see Field 5D.
W74-10173

ODORS FROM CONFINED LIVESTOCK PRODUCTION,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
J. R. Miner.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-023, $1.70; microfiche from NTIS as PB-234 182 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-74-023, April 1974. 125 p, 6 fig, 33 tab, 88 ref, 2 append. EPA 1BB039.

Descriptors: *Odor, *Livestock, *Legal aspects, Cattle, Hogs, Poultry, Hydrogen sulfide, Ammonia, *Farm wastes, *Organoleptic properties, Waste treatment.
Identifiers: *Olfaction, *Ammonia desorption, *Livestock manure, Odor control.

Current livestock production techniques result in the generation of odors which have become a source of conflict between livestock producers and society. The odorous gases responsible for the nuisance are principally low molecular weight compounds released during anaerobic decomposition of manure. Manure management systems which control or modify this decomposition offer the greatest potential for odor control. Research to identify the chemical compounds present in odorous air from animal waste degradation has yielded about 45 compounds to date. The amines, mercaptans, organic acids and heterocyclic nitrogen compounds are generally regarded as being of greatest importance. Among the techniques for odor control are: (a) site selection away from populated areas and where adequate drainage exists, (b) maintain the animal areas as dry as possible and prevent the animals from becoming manure covered, (c) select manure handling systems which utilize aerobic environments for manure storage, (d) maintain an orderly operation free of accumulated manure and runoff water, (e) practice prompt disposal of dead animals and (f) use odor control chemicals when short term odor control is necessary, such as when manure storage tank contents must be field spread. (EPA)
W74-10188

NEW MICROBIAL INDICATORS OF WASTEWATER CHLORINATION EFFICIENCY,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10189

SOURCES OF OIL AND WATER IN BILGES OF GREAT LAKES SHIPS,
Michigan Univ., Ann Arbor. Dept. of Naval Architecture and Marine Engineering.
J. B. Woodward.
Copy Available from GPO Sup Doc as EP1.23:670/2-74-054, $0.85; from NTIS as PB-233 846, $3.25 in paper copy, microfiche $1.45. Environmental Protection Agency, Cincinnati, Ohio, Technology Series Report EPA-670/2-74-054, July 1974. 33 p, 2 fig, 5 tab, append. EPA R802475.

Descriptors: *Water pollution sources, Water analysis, *Ships, Turbines, *Oil wastes, *Great Lakes, Steam turbines.
Identifiers: *Bilge water, Diesel engines(Ships), Reciprocating engines, Ship turbines.

Sources of bilge water and of oil in bilge water were surveyed aboard five ships of the Cleveland Cliffs Iron Company. The ships included two powered by steam turbines, one by a uniflow steam engine, one by a conventional reciprocating steam engine, and one by a diesel engine. It is found that many sources of bilge water are clean sources. Although no accurate estimate of the water thus contributed to the bilges can be offered, it is concluded that diverting these sources from the bilges could ease the task of separating, storing, and disposing of oil wastes. Several samples of water were taken from each ship, and analyzed for total, fixed and volatile non-filterable residue, color, pH, turbidity, total organic carbon, and oil and grease concentration. (EPA)
W74-10191

COMBINED SEWER OVERFLOW ABATEMENT PLAN, DES MOINES, IOWA,
Henningson, Durham and Richardson, Inc., Omaha, Nebr.
For primary bibliographic entry see Field 5D.
W74-10194

TURBULENT DIFFUSION IN LIQUID JETS: FINAL REPORT,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
S. C. Chaung, and V. W. Goldschmidt.
Copy Available from GPO Sup Doc as EP1.23:660/3-74-004b, $1.70; microfiche from NTIS as PB-234 171 $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-74-004b, March 1974. 126 p, 45 fig, 5 tab, 91 ref. EPA Project 16070 DEP.

Descriptors: Bubble, *Diffusion, Dispersion, Equations, Instrumentation, *Turbulence, *Turbulent flow, *Jets.
Identifiers: Bubble sampling, Bubble sizing, Concentration of contaminants, Hot film anemometer, Jet flow, Liquid jets, *Turbulent diffusion, *Turbulent transport.

Laboratory studies were conducted on the dispersion of gas droplets of different sizes in turbulent water jets. The main purpose was to determine the turbulent transport coefficient of contaminants suspended in turbulent flows. The experimental results were compared to measurements of diffusion of liquid droplets in air jets as well as to a numerical analysis based on the equations of the particles themselves. The results confirm that small particles in turbulent flows have an increasing turbulent transport coefficient with size. The collated experimental results exhibit when Reynolds analogy (in the transport of mass and momentum) can be validly employed. (See also W74-10196) (Ditsworth-EPA)
W74-10195

TURBULENT DIFFUSION IN LIQUID JETS: PART I, MEASUREMENT OF PARTICLE CONCENTRATION BY A LIGHT SCATTERING PROBE,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
C. H. Tinsley, W. S. Stevenson, and V. W. Goldschmidt.
Copy Available from GPO Sup Doc as EP1.23:660/3-74-004a, $1.15; microfiche from NTIS as PB-234 170 $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-74-004a, March 1974. 69 p, 28 fig, 2 tab, 29 ref. EPA Project 16070 DEP.

Descriptors: Equations, Instrumentation, *Particle size, Suspension, Turbulent flow, *Diffusion, *Jets, Turbulence.
Identifiers: Lasers, *Light scattering probe, Particle concentration, *Particle size measurement.

A technique for measuring particle concentrations in turbulent flows was investigated. This technique is the measurement of the light scattered from an incident beam by the solid contaminants present. The results show that for moderate concentrations the scattering system gives proportional increases in count to increases in particle concentration. The limitations of this system are the signal to noise ratio and the condition of singular scattering by the particles. Suggestions on refinements on the correlation technique used are made and observed phenomena which require further investigation are discussed. (See also W74-10195) (Ditsworth-EPA)
W74-10196

NEGATIVELY BUOYANT JETS IN A CROSS FLOW,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
J. L. Anderson, F. L. Parker, and B. A. Benedict.
Copy Available from GPO Sup Doc as EP1.23:660/2-73-012, $2.50; microfiche from NTIS as PB-234 177 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-73-012, October 1973. 199 p, 92 fig, 6 tab, 42 ref, 8 append. EPA Project 16130 FDQ.

Descriptors: *Thermal pollution, Thermal powerplants, Density currents, Entrainment, *Jets, *Waste dilution, Diffusion, Model studies, Flow, *Hydraulic models.
Identifiers: Jet discharge, Near field, Jet trajectory, *Negative buoyant jets, Densimetric Froude number.

Modification of Fan's and Abrahams jet diffusion models were used to predict the trajectory and dilution of a negatively buoyant jet. Such jets can occur when a chemical waste is discharged into a less dense ambient water or when cool, hypolimnetic water is used for condenser cooling water and discharged into less dense surface waters, then a sinking jet would result. Experimental investigations were conducted involving different combinations of densimetric Froude number, velocity ratio, and initial angle of discharge. Salt was used as the tracer, yielding a fluid that was denser than the ambient receiving water and facilitated measuring concentration profiles of the jet plume. The experimental data was then fitted with predicted jet dilution, trajectory, and cross sectional values for each model. The values of the entrainment coefficient were chosen as the one which best fit the experimental data for the particular combination of densimetric Froude number, velocity ratio, and initial angle of discharge. The value of the drag coefficient was chosen as zero for both models since any other value would predict a trajectory whose rise would be less than experimentally observed. Typically, for all angles of discharge the value of entrainment increased with a decrease in the velocity ratio and with an increase in densimetric Froude number. Additionally, there was a marked decrease in the entrainment coefficient with a decrease in the initial angle of discharge. (EPA)
W74-10200

APPLICATION OF POLARIZATION MEASUREMENTS IN TRACING TECHNIQUES,
Rhode Island Univ., Kingston.
R. Sierra.
Available from the National Technical Information Service as PB-234 143 $4.75 in paper copy, $1.45 in microfiche. M Sc Thesis, November 1973. 29 p, 2 fig, 4 graph, 4 tab, 7 ref. OWRR B-039-RI(2).

Descriptors: *Tracers, *Tracking techniques, Polarity, *Fluorescent dye, Fluorescence, Dye releases, Fluorometry, *Path of pollutants, *Pollutant identification.
Identifiers: *Polarization(Fluorescence).

A tracer with strongly polarized fluorescent output should be easily detected. The problem of tracing then is finding a region of zero or at least very small polarization in the background fluorescence. Laboratory applications could be made by careful calibration of the components involved. In field work where this calibration is not possible, it appears the technique may not be widely applicable. (Knapp-USGS)
W74-10203

ARTIFICIAL WEATHERING OF OXIDIZED BIOTITE: IV. THE INHIBITORY EFFECT OF POTASSIUM ON DISSOLUTION RATE,
Western Australia Univ., Nedlands. Dept. of Soil Science and Plant Nturition.
For primary bibliographic entry see Field 2G.
W74-10209

SOIL MOTTLING AND DRAINAGE IN A MOLLIC HAPLUDALF AS RELATED TO SUITABILITY FOR SEPTIC TANK CONSTRUCTION,
Wisconsin Univ., Madison. Coll. of Agricultural and Life Sciences.
M. J. Vepraskas, F. G. Baker, and J. Bouma.
Soil Science Society of America Proceedings, Vol 38, No 3, p 497-501, May-June 1974. 4 fig, 1 tab, 21 ref.

Descriptors: *Septic tanks, *Soil disposal fields, *Soil water movement, *Drainage, *Path of pollutants, Silts, Sands, Unsaturated flow, Oxidation, Reduction(Chemical), Hydraulic conductivity.

The feasibility of septic tank construction in a fine silty Mollic Hapludalf, with a mottled subsoil overlying permanently unsaturated sand, was investigated by measuring K values and soil drainage rates in situ. Mottles with chromas of 2 in in the silty clay loam subsoil indicated reducing conditions. Channel and plane neoferrans indicated oxidative conditions in the larger pores. High K values and drainage rates occurred at saturation, due to channels and planes, but a very strong drop of these values occurred upon desaturation. Lack of extended saturation of the entire subsoil makes possible excavation of the silt cap and construction of a septic tank seepage bed in the underlying sand. (Knapp-USGS)
W74-10212

STUDY OF WATER QUALITY PREDICTION MODELS FOR USE IN ALABAMA,
Auburn Univ., Ala. Dept. of Civil Engineering.
J. M. Morgan, and B. A. Rindt.
Available from NTIS, Springfield, Va 22151 as PB-224 339 Price $3.25 printed copy; $1.45 microfiche. Alabama Development Office Report No ALA-AU-X996-WRC-72-b, February 1973. 18 p, 50 ref. WRC-72.

Descriptors: *Water quality, *Mathematical models, *Alabama, *Reviews, Surveys, Dissolved oxygen, Biochemical oxygen demand, Model studies, *Organic loading, *Forecasting.

The literature relating to stream water quality modeling was surveyed with the goal of selecting one or more such models that could be applied to Alabama rivers within a short time frame. Because organic loading and dissolved oxygen are the most important indicators of stream water quality, only models dealing with those parameters were considered. Given the restricted time frame required by the urgent need to develop comprehensive basin plans for Alabama's rivers and the severe lack of water quality data available, a steady-state, deterministic model originally developed for use on the upper Delaware River was most appropriate. (Knapp-USGS)
W74-10237

RECONNAISSANCE OF WATER QUALITY IN THE VICINITY OF SUNNILAND OIL FIELD, COLLIER COUNTY, FLORIDA, 1971-72,
Geological Survey, Tallahassee, Fla.
E. T. Wimberly.
Water-Resources Investigations 35-73, August 1973. 10 p, 1 fig, 2 tab, 12 ref.

Descriptors: *Oil fields, *Water pollution sources, *Florida, Water pollution effects, Path of pollutants, Gas chromatography, Gravimetric analysis, *Pollutant identification.
Identifiers: *Sunniland oil field(Fla).

The surface water in the area of the Sunniland oilfield, Florida was sampled and analyzed for chloride, organic carbon, oil and grease, and crude oil. Tests for chloride, organic carbon, and crude oil showed no contamination near the field. Oily substances were detected, by a gravimetric method of analysis, in the bottom sediment from the field and in the area surrounding the field in samples collected in February 1972. However, analysis by gas chromatography using flame ionization detector on the samples collected in July 1972 indicated no crude oil in samples of water or bottom sediment. Gravimetric method of analysis only reduced interference from indigenous materials; therefore, the oily substances detected in February 1972 may have come from natural sources or otherwise. In any case, the more refined method of analysis used on samples collected in July 1972 indicated no crude oil in the samples. (Knapp-USGS)

W74-10240

EFFECT OF ACIDITY ON REACTIONS OF ORGANIC ACIDS AND AMINES WITH MONTMORILLONITIC CLAY SURFACES,
Purdue Univ., Lafayette, Ind. Dept. of Agronomy.
R. D. Harter, and J. L. Ahlrichs.
Soil Science Society of America Proceedings, Vol 33, No 6, p 859-863, November-December 1969. 5 fig, 18 ref.

Descriptors: Adsorption, *Organic acids, *Clay minerals, Pesticides, Organic compounds, Path of pollutants, Hydrogen ion concentration, Chemical potential, *Acidity, *Montmorillonite, Chemical reactions.
Identifiers: *Animes.

The effect of pH on the nature of 2,4-D, Amiben, aniline, and urea adsorbed by montmorillonite was studied using infrared spectra. In air dry systems, change of the compound to the acid or protonated form was found when the corresponding suspension pH was two to three pH units higher than the pK of the molecule. This is consistent with previous studies which indicated that the clay surface in air dry systems is more acid than shown by electrometric pH readings of the suspension. At pH levels below the pK the acids show evidence of adsorption by the clay. The amines acquire a positive charge and are capable of interacting with the clay exchange complex. Spectra of the aniline and urea adsorbed to acid clay were nearly identical to those of their hydrochlorides in the same environment, indicating reactions with the acid clay surfaces by protonated molecules. (Knapp-USGS)
W74-10244

FORMATION OF CLAY-PROTEIN COMPLEXES,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 2G.
W74-10245

A STUDY OF INCINERATOR RESIDUE ANALYSIS OF WATER SOLUBLE COMPONENTS,
Drexel Univ., Philadelphia, Pa. Environmental Engineering Program.
R. J. Schoenberger, and P. W. Purdom.
Available from NTIS, Springfield, Va 22151, PB-222 458, Price $7.00 printed copy; $1.45 microfiche. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-73-057, August 1973. 301 p, 46 fig, 55 tab, 58 ref, append. EPA Grant UI-00509.

Descriptors: *Waste treatment, *Pennsylvania, *Landfills, *Waste disposal, *Incineration, *Leaching, Solid wastes, Organic matter, Dissolved solids, Water pollution sources, Water pollution effects, Public health.
Identifiers: *Philadelphia(Penn).

Incinerator residue was studied in Philadelphia to establish procedural criteria for the rapid examination and evaluation of physical, chemical, and biological characteristics; to determine potential public health nuisance conditions resulting from placing incinerator residue in landfills with particular attention to rodent attraction and propagation, fly and insect breeding, odor emanations, wind and water erosion, and stream pollution; to determine the effect of the incenerator on the physical, chemical, and biological characteristics of residue; and to determine the maximum amount of leachable material in incinerator residue. The use of incinerator residue for landfilled site development is dependent on the length of time required for its chemical stabilization. Within 2 years 80-90 percent of the soluble material is removed by leaching. Optimization of leaching rate could enhance utilization of residue-filled sites for structural development. By proper sequencing of residue placement and spreading, maximum densities can be obtained without resorting to special compaction equipment. Hence, use of residue for development of landfill sites should not significantly increase disposal costs. Chemical components of the residue leachate are of interest when considering possible effects on concrete. The chlorides and nitrates of ammonia, magnesium, aluminum and iron attack concrete. The sulfates of calcium and sodium are also linked with degradation of concrete and these too are present in leachate. Most of the chemical problems can be eliminated by delay of construction until the residue has become chemically stable and by use of concrete protective coatings. (Knapp-USGS)
W74-10269

EFFECTS OF LANDFILL DISPOSAL OF CHEMICAL WASTES ON GROUNDWATER QUALITY,
Minnesota Univ., Minneapolis. School of Public Health.
P. K. Saint.
Available from Univ Microfilms, 300 No Zeeb Rd, Ann Arbor, Mich, 48106 (Order No 74-741). Phd Dissertion, 1973. 227 p.

Descriptors: *Landfills, *Groundwater, *Organic matters, *Metals, Salts, Laboratory tests, Chemical wastes, Bedrock, Aquifers, Flow, Microbiology, *Phenols, Biochemical oxygen demand, Water table, Toxicity, Soils, Mississippi River, Public health, Hydrogen ion concentration.

Public health and safety are threatened by disposal of toxic and hazardous wastes into landfills. In addition, soils and groundwater are contaminated. Predominant constituents are organic solvents like actone, alcohol and ether, and salts of metals, as seen in an inventory of chemical wastes generated by teaching and research laboratories at the University of Minnesota. Pits into which chemical wastes are disposed are located in an outwash sand plain, where the water table occurs at a depth of 65 ft and bedrock aquifers at a depth of 110 ft. Groundwater flow was towards the Mississippi River, with an average velocity of 1.7 ft per day. The disposal facilities are close to a groundwater divide where hydrological connections exist between the water table and bedrock aquifers. Chemical wastes lower the pH and increase the concentration of organics, BOD, and phenols. The soils act as an effective agent for temporary removal of metals but water soluble organics move easily through the soil. Thus, design for pits receiving chemical wastes should aim at protecting the groundwater through containment and collection of leachates. Wastes may be treated by increasing pH, providing adsorptive surfaces, and encouraging microbiological growth to aid the decomposition of organic substances. (Prague-FIRL)
W74-10278

HIGH-LEVEL COPPER FEEDING OF SWINE AND POULTRY AND THE ECOLOGY,
Florida Univ., Gainesville.
G. K. Davis.
Federation Proceedings, Vol 33, 2 tab, 25 ref.

Descriptors: *Copper, *Toxicity, Animals, Diets, Feeding, Agriculture, Livestock, Water pollution, Soils, *Farm wastes, Molybdenum, *Poultry, *Hogs, Sheep.

Swine and poultry have been fed high levels of copper to increase their growth. In localized areas their fecal wastes has raised the environmental level of copper and created a problem. For example, in bodies of water, copper adversely affects aquatic organisms and on land it may endanger plants and crops. In addition, animals which eat these plants may have toxic reactions. Sheep, as the most sensitive to copper toxicity, are susceptible to these increased levels only if they have inadequate dietary molybdenum. Monitoring copper feedings and knowledge of appropriate countermeasures (such as addition of lime) are necessary to control this problem. (Prague-FIRL)
W74-10295

CONSEQUENCES OF HIGH NITRATE LEVELS IN FEED AND WATER SUPPLIES,
South Dakota State Univ., Brookings. Dept. of Biochemistry.
For primary bibliographic entry see Field 5C.
W74-10296

GRAYS HARBOR ESTUARY, WASHINGTON; REPORT 1, VERIFICATION AND BASE TESTS. APPENDIX A: SUPPLEMENTARY BASE TEST DATA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-10317

SALT TOLERANCE OF MEXICAN WHEAT: I. EFFECT OF NO3 AND NACL ON MINERAL NUTRITION, GROWTH, AND GRAIN PRODUCTION OF FOUR WHEATS,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
For primary bibliographic entry see Field 3C.
W74-10328

MEASUREMENT OF THE DIFFUSION COEFFICIENT OF BORON IN SOIL USING A SINGLE CELL TECHNIQUE,
College of Agriculture, Sungei Besi (Malaysia).
W. Sulaiman, and B. D. Kay.
Soil Science Society of America Proceedings, Vol 36, No 5, p 746-752, September-October, 1972. 5 fig, 3 tab, 20 ref.

Descriptors: *Nutrient removal, *Boron, *Trace elements, Nutrients, *Diffusion, Soil chemistry, Soil physics, Soil water, *Path of pollutants.

The porous system diffusion coefficient, Dp, of boron in a loam soil was measured by means of a single cell technique. Boron diffused from a semi-infinite medium of uniform initial concentration to a sink of constant concentration which was separated from the soil by a dialysis membrane. A polyethylene glycol 6,000 solution circulated through the sink and controlled the soil matric suction osmotically. The diffusive flux at the soil and membrane interface was treated as an evaporative process. The value of Dp was found to be 2.44 plus or minus 0.00000017 sq. cm/sec. when the bulk density of the soil and the volumetric moisture content were 1.30 gm/cm3 and 0.31, respectively. The significance of the equilibria between absorbed and solution B on the diffusion rate of B was also studied. Addition to the soil of boric acid solutions of concentrations lower than 1 ppm resulted in a capacity factor and solution B concentration which were lower than the corresponding values when water containing no B was added. As a consequence, the quantity of B diffusing into the sink from the boron-treated soil was less than that from the untreated soil. (Skogerboe-Colorado State)
W74-10329

NITRATE-N ACCUMULATION IN THE SOIL PROFILE UNDER ALFALFA,
Illinos Univ., Dept. of Agronomy. Urbana.
D. L. Schertz, and D. A. Miller.
Agronomy Journal, Vol 64, No 5, p 660-664, September-October, 1972. 7 fig, 4 tab, 10 ref.

Descriptors: Nutrient removal, *Nitrates, *Alfalfa, Leaching, Water pollution sources, Rotations, Crop production, Crop response, *Path of pollutants, *Soil profiles.
Identifiers: *Nitrate nitrogen.

Eight split applications of N totaling 0, 224, 448, and 672 kg/ha (0, 200, 400, and 600 pounds/acre) were studied at Urbana, Illinois, at various depths on six sampling dates. Soil was sampled at depths of 0 to 15, 15 to 30, 30 to 60, 60 to 90, and 90 to 105 cm or to the water table, which was never lower than 105 cm. Soil samples were dried, finely ground, and analyzed for nitrate nitrogen. Nitrate nitrogen concentrations were greatest in March 1970 at the 30- to 60-cm depth. No more than 1 ppm was found at the 90- to 105-cm depth (water table) for any N treatments on November 11, 1970. Highest concentrations of nitrate nitrogen were found at the 15- to 30-cm depth for all N treatments at the end of the growing season, November 11. Although total amounts of nitrate nitrogen were lower in March than in November, the highest accumulations were found at the 30- to 60-cm depth in March, but at the 15- to 30-cm depth in November. The only treatment on November 11 that did not show a significant difference when compared to the check was the 224 kg N/ha. (Skogerboe-Colorado State)
W74-10330

FURTHER CONTRIBUTION TO THE STUDY OF NITRIFICATION IN THE SEA AND IN A BRACKISH WATER ENVIRONMENT (IN ITALIAN),
Messina Univ. (Italy). Istituto di Idrobiologia.
V. Bruni, and T. Maugeri.
Boll Pesca Piscic Idrobiol, Vol 26, No 1/2, p 77-86, 1971. English summary.

Descriptors: *Aerobic fermentation, *Anaerobic nitrification, Autotrophic nitrification, Brackish water, Environment, *Heterotrophic nitrification, Nitrates, *Nitrification, Nitrites, Sea water.

Microbial nitrification was investigated on several samples from different places. Results confirm the slowness of the transformation to nitrate as compared with transformation to nitrite and, beside the known aerobic fermentation, an anaerobic nitrification also occurs. The remarkable positiveness of the transformation to nitrite in samples rich in organic matter is in accordance with the possibility of an heterotrophic with the autotrophic nitrification.--Copyright 1973, Biological Abstracts, Inc.
W74-10341

QUALITY OF DRAINAGE WATER FROM A HEAVY-TEXTURED SOIL,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
G. O. Schwab, E. O. McLean, A. C. Waldron, R. K. White, and D. W. Michener.
Paper No. 72-733 presented at Winter Meeting of the American Society of Agricultural Engineers, December 11-15, 1972, Chicago, Illinois. 13 p, 2 fig, 4 tab, 11 ref.

Descriptors: *Drainage, *Subsurface drainage, *Tile drainage, Water quality, Salinity, Water chemistry, Ion transport, *Soil texture, Dissolved solids, Biochemical oxygen demand, *Ohio, Hydrogen ion concentration, Electrical conductance.

Sediment, dissolved solids, nine chemical elements or ions, five pesticides, electrical conductivity, pH, and BOD in tile effluent and in surface runoff were measured from field plots in Toledo silty clay soil near Sandusky, Ohio, for the period 1969-71. Measurements were taken from both conventional tilled and no tilled plots in continuous corn. Laboratory studies were also made on phosphorus movement. (Skogerboe-Colorado State)
W74-10346

5C. Effects Of Pollution

AQUATIC FUNGI IN RIVERS: THEIR DISTRIBUTION AND RESPONSE TO POLLUTANTS,
Virginia Polytechnic Inst. State Univ., Blacksburg. Dept. of Biology.
D. F. Farr, and R. A. Paterson.
Available from the National Technical Information Service as PB-233 790 $3.25 in paper copy, $1.45 in microfiche. Virginia Water Resources Research Center, Blacksburg, Bulletin 68, April 1974. 45 p, 5 tab, 11 fig, 20 ref. OWRR A-043-VA(2).

Descriptors: *Aquatic fungi, Lotic environment, Nutrients, Heavy Metals, *Virginia, Distribution, *Zinc, Water pollution effects, Water pollution sources.
Identifiers: *New River(Va), Little Stony Creek(Va), *Cyanide, *Mannitol, Blacksburg(Va), *Phycomycetes, *Achyla caroliniana, *Rhizidium sp.

Two lotic habitats in the vicinity of Blacksburg, Va were selected for field investigations. The New River represented a river with a high nutrient load. Little Stony Creek, a tributary of the New River, has no sources of man-made effluent which might contribute nutrients to the stream. Collecting sites on the New River were located above, just below, and some distance farther downstream from the effluent outfall of a munitions plant. The effect of this effluent on the number of taxa was not conspicuous. However, there was a reduction in the number of taxa per collection at the station near the effluent when compared with the other stations. Filamentous aquatic Phycomycetes, such as Achyla, Saprolegnia, and Pythium were commonly found in both habitats. However, greater diversity of the chytrid type of aquatic Phycomycete was found in Little Stony Creek as compared to New River. Twelve chytrid taxa were found in Little Stony Creek and two in New River. Two fungi, Achyla caroliniana from the New River and Rhizidium sp. from Little Stony Creek, were studied in pure culture in terms of the effect of common pollutants on their growth and reproduction. The A. caroliniana had higher tolerances to zinc, cyanide, and mannitol as compared to the Rhizidium sp. The Rhizidium was more tolerant to higher concentrations of detergents than the Achyla.
W74-09810

IODINE METABOLISM IN CHILDREN AND ADOLESCENTS IN AN AREA OF THE COMMUNITY,
Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.
L. Karhausen.
Avail: NTIS, Springfield, Va., as Rept. No. AEC-tr-7481; $5.45/copy, $1.45/microfiche. Atomic Energy Commission Report AEC-tr-7481, 1974. Translation of French report EUR-4864, (1974). 140 p, 30 fig, 44 tab, 75 ref.

Descriptors: *Kinetics, *Transfer, *Iodine, *Human population, *Model studies, *Digestion, Fallout, Transfer, Path of pollutants, Biology, Biocontrol, Food chains, Metabolism, Age, Growth stages, Safety, Standards, Biochemical.

The aim is to establish a European model of thyroid function during growth and from it to draw conclusions with regard to radiation protection. Kinetic studies involving iodine 131 and iodine 125 were carried out on 46 infants and 47 adolescents. A three-compartment model is presented for age groups from 0 to 6 months, six months to one year, one to two years, and for adolescents and adults. The International Commission on Radiation Protection diameters were calculated for the various age groups. These models were then applied to radiation protection and an attempt was made to determine whether the representation could be simplified by reducing it to two compartments. This appears feasible if application is limited to thyroid dosimetry. In the second part of the study, the aim is to extend this model to other areas of the Community, where the iodine ingested and the thyroid uptake are undoubtedly different from those observed in the first study. (Houser-ORNL)
W74-09827

RADIOBIOLOGY AND RADIOECOLOGY OF FARM ANIMALS.
Atomizdat, Moscow (USSR).
Avail: NTIS, Springfield, Va., as Rept. AEC-TR-7523; $7.60/copy, $1.45/microfiche. Atomic Energy Commission Report AEC-TR-7523, 1973. Translation by B. N. Annekov, I. K. Dibobes, and R. M. Aleksakhin, Radiobiologiya i Radioekologiya Sel 'skokhozyaistvennykh Zhivotnykh, 1973. 224 p, 33 fig, 107 tab, 395 ref.

Descriptors: *Radioecology, *Radioisotopes, *Food chains, Transfer, Hydrologic cycle, *Absorption, *Fallout, Movement, *Path of pollutants, Diffusion, Environment, Animal metabolism, Digestion, Plants, Human population, Public health, Biology, Bioindicators, Agriculture.

Problems are discussed of the migration of the most important artificial radionuclides in the biological chain of fodder -- farm animals. The metabolism of radionuclides in the bodies of farm animals and the effect of external irradiation and incorporated radionuclides on these animals are examined. The results of extensive experimental studies conducted in the USSR and abroad are summarized. In addition to their theoretical interest, the data presented are of practical value in developing measures for reducing the conversion of radioactive substances into livestock and agricultural products. (Houser-ORNL)
W74-09828

PROJECT RIO BLANCO: PROMPT ECOLOGICAL EFFECTS RESULTING FROM GROUND MOTION,
Geonuclear Corp., Las Vegas, Nev.
F. W. Whicker, A. W. Alldredge, and W. C. Hanson.
Aval: NTIS, Springfield, Va., as Rept. No. PNE-RB-47; $5.45/copy, $1.45/microfiche. Report No. PNE-RB-47, July 17, 1973. 71 p, 31 fig, 6 tab.

Descriptors: *Nuclear explosions, *Secondary recovery(Oil), *Natural gas, *Ecology, Ecosystems, *Environmental effects, Animal behavior, Fish behavior, Birds, Nesting, Speciation, Varieties, Water pollution, Suspended solids, Solutes, Streams, *Colorado.
Identifiers: *Fawn Creed(Colo).

Project Rio Blanco, an experiment involving deep underground detonation of three, 30-kiloton nuclear explosives designed to stimulate natural gas production in geologic formations of low permeability, was conducted on 17 May 1973. The emplacement well (EW) for this experiment was located in the Fawn Creek drainage, a tributary of Piceance Creek, in western Colorado some 30 miles southwest of the town of Meeker. The three nuclear explosives for Project Rio Blanco were detonated at 1000:00.12 plus or minus 0.01 second, Mountain Daylight Time, or 1600:00 plus or minus 0.01 second, Greenwich Mean Time. The three explosions occurred within the Fort Union and Mesaverde formations at depths of 5,838.5 feet, 6,229.7 feet, and 6,689.5 feet. A brief discussion of the ecological effects is presented. (Houser-ORNL)
W74-09831

ELECTRICAL ENERGY AND ITS ENVIRONMENTAL IMPACT - PROGRESS REPORT, DECEMBER 31, 1972.
Oak Ridge National Lab., Tenn.

Aval: NTIS, Springfield, Va., as Rept. No. ORNL-NSF-EP-40; $5.45/copy, $1.45/microfiche. Report No. ORNL-NSF-EP-40, March 1973. 125 p, 7 fig, 21 tab, 123 ref.

Descriptors: *Energy, *Environmental effects, *Coals, Economics, Ecology, Air pollution, Fallout, Effluents, Water pollution, Soil contamination, Fuels, Radioactivity, Natural resources, Trace elements, Lakes, Streams, *Mining.

In considering environmental problems related to energy, the impacts from the production and use of coal are particularly noted. Work has included several investigations of the impacts and possible alternatives in coal mining, particularly the widespread devastation that has occurred in the Appalachian Mountain regions. Feasible alternatives, both technological and economic, will be examined for obtaining adequate energy supplies at an acceptable environmental cost. An experimental investigation is underway of the emission of toxic trace elements from a coal-fired power plant. In this work, the quantities of each element emitted from the plant and the levels of buildup in the environment will be determined. The hope is to make some contribution to a more rational use of the nation's limited resources in fuels, land, air, and water. (Houser-ORNL)
W74-09836

PRELIMINARY EVALUATION OF METHODS FOR THE DISPOSAL OF TRITIATED WATER FROM NUCLEARLY STIMULATED NATURAL GAS WELLS,
Oak Ridge National Lab., Tenn.
W. D. Arnold, R. Salmon, K. H. Lin, and W. DeLaguna.
Aval: NTIS, Springfield, Va., as Rept. No. ORNL-TM-4024; $4.00/copy, $1.45/microfiche. Report No. ORNL-TM-4024, April 1973. 52 p, 3 fig, 4 tab, append.

Descriptors: *Radioactive waste disposal, *Tritium, *Safety, *Evaluation, *Nuclear explosions, *Secondary recovery(Oil), *Gases, *Natural gas, Water pollution, Water pollution sources, Assay, Assessment, Environmental effects, Public health.

Large volumes of slightly tritiated water will be produced from natural gas fields developed via nuclear stimulation. The Rio Blanco field in Colorado, for example, could produce more than 1 billion gal of water with a tritium activity of about 525 microCi/gal. Proper disposal of the tritiated water is essential to the success of nuclear stimulation in natural gas recovery. Evaluations based on feabibility, safety, and cost indicate that injection into deep wells, evaporation into stacks, and evaporation from ponds are the best disposal methods. At this point, none of the three is clearly superior to the others. Each has potential advantages and disadvantages that can best be evaluated in actual tests. These disposal tests can be made in conjunction with the production testing of the first Rio Blanco well. While no unfavorable environmental effects would be expected from the tests, they can be monitored to ensure that this is the case and can be terminated if necessary. (Houser-ORNL)
W74-09837

ENVIRONMENTAL MONITORING AT MAJOR U.S. ATOMIC ENERGY COMMISSION CONTRACTOR SITES, CALENDAR YEAR 1972.
Division of Operational Safety (AEC), Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-09840

OFFSHORE NUCLEAR POWER SITING WORKSHOP.
Division of Biomedical and Environmental Research (AEC), Washington, D.C.
Available from NTIS, Springfield, Va. as Rept No WASH-1280; $4/copy, $1.45/microfiche. Workshop held in Rockville, Maryland October 15-16, 1973 Report No WASH-1280, (1973). 44 p, 2 fig, 57 ref.

Descriptors: *Nuclear powerplants, *Nuclear reactors, *Sites, Oceans, *Offshore platforms, Coastal structures, Environment, Environmental effects, Aquatic environment, Oceanography, Geochemical, Marine biology, Water pollution, Public health.

This report is the product of a workshop meeting held to discuss potential marine environmental problems connected with the construction and operation of nuclear power plants which will be located in the near shore coastal regions. Approximately 40 persons were in attendance representing academic oceanographic research organizations, Federal agencies with coastal marine interests and both the Office of Regulation and other Headquarters Divisions of AEC. Many scientific disciplines and aspects were represented and discussed. The workshop approached the environmental problems from three viewpoints: air-sea interactions (physical oceanography); water-sediment interactions (geochemical); and marine biology. Evaluation were made by each group on the following: (1) Current technical knowledge of the selected area as related to floating nuclear plant (FNP) environmental impact; (2) Capability of today's 'state-of-the-art' in assessment of environmental impact of FNP in the marine environment; and (3) Estimation of the level of effort and time frame required to obtain necessary information to fill the gaps in current knowledge of the subject area. (See W74-09863 thru W74-09865) (Houser-ORNL)
W74-09862

WATER MOTION AND WATER-SEDIMENT INTERACTION,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5B.
W74-09863

BIOLOGICAL ASPECTS OF OFFSHORE NUCLEAR POWER PLANTS,
Scripps Institution of Oceanography, La Jolla, Calif.
R. Eppley, C. Yentsch, L. McHugh, H. Hamilton, and K. Sherman.
In: Offshore Nuclear Power Siting Workshop Report No WASH-1280, p 17-28, (1973). 18 ref.

Descriptors: *Environmental effects, *Nuclear powerplants, *Offshore platforms, *Sites, *Effluents, Biology, *Biodegradation, Biological communities, Radioactivity, Water pollution, Ecology ecosystems, Food chains, Public health, Construction, Operations.

Possible environmental biological problems that would be associated with the construction and operation of offshore nuclear powered electrical generating stations are described. One objective was to identify and characterize research needs. Possible causes of impacts that could be associated with construction, the structures themselves, and operation of offshore nuclear generating stations were identified. Possible impacts are classed by 'causes' as: physical-mechanical, thermal, chemical or radiological. The possibilities of obtaining information in order to evaluate biological effects are addressed. The important questions asked are: (1) What is the base line of information. (2) What is the areal extent of the problems. (3) What is the temporal nature of the effects or of the problems. (4) Are some aspects of impacts of the power plant non-detrimental. Research which should be undertaken to understand the problems was identified. (See also W74-09862) (Houser-ORNL)
W74-09864

OCEANIC ATMOSPHERIC DISPERSION,
Woods Hole Oceanographic Institution, Mass.
G. Csanad, P. Frenzen, P. Michael, D. Slade, and A. Hersch.
In: Offshore Nuclear Power Siting Workshop Report No WASH-1280, p 29-36, (1973). 2 fig, 1 ref.

Descriptors: *Nuclear powerplants, *Nuclear reactors, *Sites, *Offshore platforms, Effluents, *Oceans, *Atmosphere, *Disperson, Air circulation, Meteorology, Radioactivity, Iodine, Tritium, Air, Water, Boundary processes, Mass transfer, Transmissivity, Research and development, Research priorities, Environment, Ecology.

A typical two-unit plant will reject excess heat at a calculated rate over roughly 20 square kilometers. Unless a strong net advective current is present, an accumulation of heat and chemical pollutants will occur in the neighborhood of the plant, leading to adverse ecological consequences and likely violations of state thermal standards. Furthermore, the relatively long-residence time of dilution water under conditions of weak net flow will increase the impact of biological entrainment. One major goal of a research program should be to establish the extent of 'influence zones' adjacent to offshore power plants. Research on atmospheric dispersal problems is recommended in three areas: (A) turbulence and diffusion in maritime planetary boundary layer; (B) mesoscale circulations; and (C) air-sea mass exchange. Volatile compounds such as methyl iodide, radioactive nobel gases and tritium partition between the atmosphere and the sea. Particulates may adhere to the water surface or enter the water column. The surface ocean spray may act to wash these components out of this boundary layer. As a result of these and similar processes, mass transfer from air to sea takes places which is qualitatively characterized by the value of the 'deposition velocity.' The deposition velocity for the gases and particulates concerned has not been defined and mass transfer coefficients between air and sea water are largely unknown for the individual species. (See also W74-09862) (Houser-ORNL)
W74-09865

THE REGULATION OF THE ENVIRONMENTAL EFFECTS OF NUCLEAR POWER PLANTS,
Consolidated Edison Co. of New York, Inc., New York.
J. P. Davis.
Nuclear Safety, Vol 14, No 3, p 165-181, May-June 1973. 122 ref.

Descriptors: *Radioactivity, *Environmental effects, *Nuclear powerplants, Effluents, Gases, Liquids, Solid wastes, *Regulation, Standards, Legal aspects, Aesthetics, Sites, Public health, Toxicity.

The radiological and nonradiological effects of nuclear power generation on the environment and the means for their regulation are discussed along with some related cases and controversies. Proposals for improvements through changes in procedures and new legislation are also examined. (Houser-ORNL)
W74-09866

PU-238 INCORPORATED IN FISH LIVING IN WATER CONTAINING PUO2/238,
Los Alamos Scientific Lab., N. Mex.
W. H. Adams, and E. B. Fowler.
Available from NTIS, Springfield, Va. as Rept No LA-DC-12899; $4/copy, $1.45/microfiehc. Report No LA-DC-12899, February 1970. 8 p, 5 tab.

Descriptors: *Fish, *Plutonium, *Biology, Absorption, Radioisotopes, Oxides, Solubility.
Identifiers: Concentration, Whole body, *Body organs.

Described are two studies of fish exposed to water with known concentrations of plutonium-238. Tabular data are given for radioactivity found in the fish after varying days exposure to plutonium. Control data were maintained for the concentration of the water for days from 9 to 185. The concentrations of plutonium in various body parts are given. Similar data were recorded for snails grown in 238-PuO-2 spiked water. (Houser-ORNL)
W74-09867

POSSIBLE EFFECTS OF IONIZING RADIATION UPON MARINE LIFE AND SOME IMPLICATIONS OF POSTULATED ACCIDENTAL RELEASES OF RADIOACTIVITY,
California Univ., Los Angeles. Office of Environmental Science and Engineering.
A. F. Moscati, and R. C. Erdmann.
Nuclear Technology, Vol 22, No 2, p 184-190, May 1974. 3 tab, 11 ref.

Descriptors: *Radioactivity effects, *Water pollution effects, *Food chains, Ecology, *Genetics, Population, *Aquatic life, Aquatic animals, Aquatic plants, Sessile algae, Plankton, Shellfish, Fish, Path of pollutant, Dispersion, Waste dilution, Model studies, Accidents, Analysis.
Identifiers: Concentration, *Specific activity, Critical radionuclide.

Two models for predicting the impact of radioactivity in the food chain upon man are reviewed: (a) the critical pathway concept, and (b) the specific activity approach. In an accident situation involving the release of radioactivity from a light-water power reactor to the ocean, the most important radionuclides on the basis of the type of radiations emitted, quantity produced, half-life, and biological significance are the fission products Sr-90, Cs-137, Pu-239, and the activation products Zn-65, Fe-54, and Zr-95. The specific activity approach as applied to three classes of accidental radioactive releases to the sea can be used to determine the sensitive nuclide for each release and to estimate the relative degree of seriousness of each release by calculating the volume of seawater needed to dilute each spill to the maximum permissible concentration of the critical nuclide. Estimates are made for three types of accidental releases at sea. (Houser-ORNL)
W74-09871

POPULATION DOSES FROM THE NUCLEAR INDUSTRY TO 2000 A.D.
Nuclear Safety, Vol 15, No 1, p 56-66, Jan-Feb 1974. 4 fig, 5 tab, 13 ref.

Descriptors: *Nuclear energy, *Nuclear powerplants, *Nuclear wastes, *Effluents, *Environmental effects, Radioactivity, Liquid wastes, Gases, Solid wastes, Toxicity, Human population, Standards, Regulation, Forecasting, Estimating, Biocontrol, Biodegradation, Radioisotopes, Path of pollutants, Tritium, Iodine, Cesium.
Identifiers: Doses.

During the next few decades, it is anticipated that the nuclear power industry in the United States will undergo a remarkable growth. To project the effect of this growth on the radiation doses to the general public, the U.S. Atomic Energy Commission made a review of current reactor operating experiences. From this review a detailed analysis of the radiation dose to a major section of the country due to effluents from nuclear facilities for conditions projected for the year 2000 was undertaken. The study indicates that the average dose to the U.S. population from nuclear power will increase from an estimated 0.003 mrem per person in 1970 to as much as 0.2 mrem in the year 2000. This contribution remains a small fraction of the radiation dose from either natural or man-made sources of ionizing radiation. (Houser-ORNL)
W74-09872

ADDITIONAL HIGH LEVEL WASTE FACILITIES--SAVANNAH RIVER PLANT, AIKEN, SOUTH CAROLINA, (DRAFT ENVIRONMENTAL STATEMENT).
Atomic Energy Commission, Washington, D.C.
Available from NTIS, Springfield, Va., as Rept No WASH-1530, $5.45/copy, $1.45/microfiche. Report No WASH-1530, January 1974. 86 p, 25 fig, 5 tab, 15 ref, 2 append.

Descriptors: *Radioactive waste disposal, *Waste storage, *Nuclear powerplants, Effluents, Fuels, Industrial production, *Radioactivity effects, Environmental effects, Assessment, Safety, Evaluation, *South Carolina.
Identifiers: Fuel fabrication, *Savannah River, *Environmental Impact Statement, Storage containers, Tanks.

This environmental statement was prepared in accordance with the National Environmental Policy Act and in support of the U.S. Atomic Energy Commission's proposal for legislative authorization and appropriations for the design and construction of project 75-SR-001 'Additional High Level Waste Storage Facilities, Savannah River, South Carolina.' Additional waste tanks and evaporators are needed to meet forecast production of nuclear materials, and to replace older tanks which will be removed from service for detailed examination. The proposed addition to present waste management facilities will consist of six 1.3-million gallon high activity waste tanks, a waste evaporator, and associated auxiliaries. The proposed tanks will incorporate the latest technology pertaining to fabrication, stress relieving, inspection techniques and acceptance testing. Special consideration will be given to improved methods of integrity monitoring and safe operating techniques. (Houser-ORNL)
W74-09873

EXPERIMENTAL WATER TOXICOLOGY,
G. P. Andrushaytis.
Available from NTIS, Springfield, Va. 22151 AD-760 400, Price $3.75 printed copy; $1.45 microfiche. Army Foreign Science and Technology Center Technical Translation Report FSTC-HT-23-163-73, March 1973. 29 p, 6 fig, 1 tab. (Translated from Biology Institute of the Latvian Academy of Sciences, by the Universal Language Services, Inc.)

Descriptors: *Pesticides, *Water pollution effects, Reviews, *Toxicity, Toxins.
Identifiers: *Toxicology, *USSR.

Problems in water toxology are reviewed. Current research in the USSR is outlined. Individual articles are devoted to such subjects as blood analysis of fish subjected to Diuron and the effect of 2,4,-D acid. (Knapp-USGS)
W74-09889

LAKE MICHIGAN,
J. Parker.
In: Our Environment: The Outlook for 1980, Part I: Our Environment: Water, Edited by Alfred J. Van Tassel, Lexington Books, Lexington, Mass., p 25-50, 1973. 1 fig, 9 tab, 20 ref.

Descriptors: *Lake Michigan, *Water quality, Water quality control, *Water pollution, *Biochemical oxygen demand, Watershed management, Treatment, Pollution abatement, Water pollution treatment, Water pollution effects, Projections, Municipal wastes, Industrial wastes, Thermal pollution.
Identifiers: Milwaukee(Wisc.), Chicago(Ill.), Green Bay(Wisc.), Calumet(Ind.), 1980 water quality projections.

Lake Michigan, the sixth largest freshwater lake in the world, has a surface area of approximately 22,400 square miles. Rivers tributary to the lake are long, allowing purification of wastes prior to discharge. The size of the lake and the lengths of its tributaries make water pollution problems local in nature, with the greater portion of the lakewater of good quality. Between 1970 and 1980 the population within the watershed boundary is expected to increase 12.2% from 6,330,000 to 7,105,000. Industrial waste is the greatest overall source of pollution. Municipal sewage can pose a significant local problem, and its importance will increase as sparsely populated communities develop integrated sewer systems. Remedies are treatment facilities, which include secondary treatment and 80% phosphate removal by 1972 for all major municipalities, and legislative abatement programs enacted by the Four State Enforcement Conference. These programs include continuous disinfection of municipal effluents, treatment facilities for industrial plants, and prohibition of combined sewers. It is estimated that the highly industrialized Calumet area and the Greater Chicago area will see a gradual improvement in water quality due to advanced waste treatment. The Milwaukee Area which will discharge 176 million pounds of BOD in 1980, will not be able to upgrade its already efficient removal capacity enough to significantly improve water quality, and the Green Bay Area water is already so polluted that even advanced treatment projects now underway will be incapable of generating a satisfactory quality water. In general there is good cause to believe that Lake Michigan water will improve in quality by 1980. (See also W74-09964) (LaPointe-North Carolina)
W74-09953

LAKE ERIE,
R. Vollkommer.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 51-74, 1973, 5 fig, 6 tab, 19 ref, 1 append.

Descriptors: *Lake Erie, *Water quality control, *Water pollution, *Biochemical oxygen demand, Watershed management, Treatment, Pollution abatement, Water pollution treatment, Water pollution effects, Basins, Projections, Municipal wastes, Industrial wastes, Thermal pollution, Phosphorus, Nitrates.
Identifiers: +(*) WATER QUALITY PROJECTIONS.

Lake Erie, with 3 major subbasins, western, central and eastern, serves as a drainage basin for a low level, clay rich land formed by glacier abrasion and depositions. Because of its shallowness and large silt input the western basin is the most turbid, with high algal productivity. Summer thermal stratification causes rapid oxygen depletion toward the bottom. Pollution loads are also highest in this basin with BOD discharged (309 million pounds in 1966) nearly 3 times as great as either of the other 2 basins and phosphorus and nitrate concentrations the highest in all of Lake Erie. Much of the shoreline is a health hazard. The central basin, with overenriched turbid water and excessive algal growth, receives nutrient wastes from 2.9 million people. The eastern basin, serving the cities of Erie, Pa., and Buffalo, N.Y. has the least serious damage due to its large depth and volume and low pollutant discharge. The fundamental problem of Lake Erie is the overenrichment with essential plant nutrients compounded by shallowness, warmth, and natural sedimentary input. The major source of pollution (BOD AND NUTRIENTS) is in the form of municipal sewage. Assuming 90% efficient secondary treatment by 1980 on all sewage, the population equivalent drops by a factor of five. Major pollution sources are steel, paper, rubber, chemical, and food industries, with rapid industrial growth anticipated. Provisions will have to be made to overcome the additional load arising from increasing population and industrial growth, to reduce the nutrient levels along with BOD reduction, and to eliminate other pollutants causing discoloration, odors, and toxicity. (See also W74-09964) (LaPointe-North Carolina)
W74-09954

PUGET SOUND,
D. G. Niddrie.
In: Our Environment: The Outlook for 1980, Part I. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass, p 75-94, 1973, 3 tab, 9 ref, append.

Descriptors: *Water quality, Water quality control, *Water pollution, *Biochemical oxygen demand, Watershed management, Treatment, Pollution abatement, Water pollution treatment, Water pollution effects, Basins, Projections, Municipal wastes, Industrial wastes, Thermal pollution, *Washington.
Identifiers: *1980 water quality projections, *Puget Sound(Wash.), Snohomish County(Wash.), Pierce County(Wash.).

Puget Sound is a deep salt water basin with a total surface area of 650,000 acres and 1,330 miles of shoreline. Because of its wide area and great depths (up to 930 feet), the sound has an enormous natural assimilative capacity. Pollution problems, thus, are restricted to small areas of the sound where large discharges occur. Domestic wastes do not contribute in any great extent to the degradation of water quality. Serious pollution problems do occur, however, from industrial wastes, most importantly the pulp and paper industry, contributing in many areas greater than 90% of the BOD load. The State of Washington has developed a very effective pollution abatement program which is administered by the Department of Ecology. The program consists of specific stream standards for every watercourse in the state, treatment requirements for compliance with the standards, the issuance of waste disposal permits to control industrial waste discharge, on-site inspection and monitoring of treatment facilities, and the levying of civil penalties to any waste permit violator. Due in large measure to this program presently undeveloped areas of Puget Sound will not undergo degradation in the future. However specific industrialized counties may encounter localized problems, among these Snohomish County (453 million pounds BOD by 1980, 93% attritutable to pulp and paper operations), and Pierce County. Whether treatment facilities such as the Georgia-Pacific pulp waste treatment plant in Bellingham will be able to maintain or improve current water quality is still uncertain. (See also W74-09964) (LaPointe-North Carolina)
W74-09955

SAN FRANCISCO BAY,
R. A. Matern.
In: Our Environmental: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A.J. Van Tassel, Lexington Books, Lexington, Mass., p 95-125, 1973, 4 fig, 6 tab, 8 ref, 4 append.

Descriptors: *Bays, *Water quality, Water quality control, *Water pollution, *Biochemical oxygen demand, *Pollution abatement, Watershed management, Interceptor sewers, Water pollution treatment, Water pollution effects, Coliforms, Projections, Municipal wastes, Industrial wastes, California.
Identifiers: *San Francisco Bay, *1980 water quality projection.

The San Francisco Bay system includes a total distance of 85 miles extending from Chipps Island to the mouth of Coyote Creek near San Jose. The Bay is very shallow with an average depth of about 20 feet. The principal fresh water inflows are the San Joaquin and Sacramento River basins, comprising nearly 40% of the total area of the State of California. To combat severe water quality problems the State Water Resources Control Board, in March of 1969, issued a report detailing concrete solutions. The proposed program consists of three phases. Phase 1 to be completed in 1980 at an estimated total cost of $1,473 million, includes the construction of a system of 5 interceptors which would discharge wastewater into large treatment facilities or into deep bay water. Wastewater discharges from South Bay, San Pablo, and Suisun Bay areas would be completely eliminated. Phase 2 consists of providing a disposal system to the ocean, which has 4 times the dilution capability of the bay. By 1990 BOD removal, for the entire Bay-Delta area should be 85%. Phase 3 has two options, one for water reclamation, and one for protection of estuarine environments. Industrial growth in the next decade will be very rapid especially in certain industries associated with high BOD discharges (often located in the South Bay area). Among them are cane sugar refining, canned fruits and vegetables, paper mills, and paper coating. At present the worst water quality parameter is that of coliform bacteria with concentrations measured as high as 2 million per 100 ml. in the South Bay area. Between 1963 and 1968 31 fishkills were also reported. Despite large expenditures, there is little likelihood for any significant improvement in water quality by 1980. (See also W74-09964) (LaPointe-North Carolina)
W74-09956

LONG ISLAND SOUND,
R. T. Caponi.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 127-147, 1973, 2 fig, 1 tab, 29 ref.

Descriptors: *Water quality, Water quality control, *Water pollution, *Biochemical oxygen demand, *Nutrients, Watershed management, Water pollution treatment, Legislation, Water pollution effects, Boating, Shellfish farming, Sounds, Projections, Municipal wastes, Industrial wastes, Thermal pollution, *New York, New Jersey, Connecticut.
Identifiers: *Long Island Sound(N.Y.), *Interstate Sanitation Commission, 1980 water quality projections.

The major pollution sources for the Long Island Sound, which has an area of 930 sq. mi. and an average depth of 60 feet, are the numerous primary and secondary sewage treatment plants which serve the 1,300,000 people living in the direct vicinity. The Connecticut River Basin, the Housatonic River Basin, and the Thames River Basin are chief fresh water contributors. The major problem arising from pollution discharge are plant nutrients leading to excessive growths of algae, and bacteria concentrations. Long Island is a heavily touristed area and the worsening water quality is damaging this industry as well as the once thriving shellfish industry (76,000 of 183,000 acres suitable for shellfishing have been closed due to pollution). In 1936 the Interstate Sanitation Commission (N.Y., N.J., and Conn.) was found and proceeded to classify and oversee the majority of waters in the tristate area. In 1967 the three states agreed to secondary treatment for all their municipal plants by 1972, and New York and Connecticut voters have approved bond issues for construction of plants. Such treatment capacity will be needed to handle the increased population projected to be 1,400,000 by 1980. Controls must also be established from industrial discharges of pharmaceutical and paper industries on the Thames and Mill Rivers in Connecticut, oil spills from harbor tankers, and human waste and gasoline discharges from pleasure boating. (See also W74-09964) (LaPointe-North Carolina)
W74-09957

HUDSON RIVER,
R. M. Martin.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 149-174, 1973. 11 tab, 27 ref.

Descriptors: *Hudson River, *Water quality, Water quality control, *Water pollution, *Nutrients, Biochemical oxygen demand, Watershed management, Water pollution treatment, Water pollution effects, *Pulp wastes, Pulp and paper industry, Projections, Municipal wastes, Industrial wastes, *New York, New Jersey, Bond issues.
Identifiers: *1980 Water quality projections.

Tidal influence is a major factor in the recirculation rate of nutrients during the dry months in the Hudson River. Fresh water inflow is sufficient for an exchange rate of only about 0.3-2.5% per day. With a drainage area of 12,400 to 14,500 sq. mi., serving a population of about 12 million, the Hudson is severely subject to high nutrient loadings. Phosphorus concentrations in Manhattan have been as high as 4 times that of an unpolluted water (12 ppb vs. 2.8 ppb). Projections indicate that Mid Hudson and Lower Hudson (New York City) areas will experience the most significant growth in this decade, with a total state population of 20 million by 1980. Industrial growth is expected to shift from 'non durables' such as food processing and textiles to less polluting 'durables' like machinery, with the phase out of some heavily polluting paper mills in the north. The grossly different population densities along its course together with the river's strong regenerative capacity, necessitate an analysis of the Hudson by sectors. The Upper Hudson, or Albany area, due to heavy waste discharge from paper mills, has been characterized as an 'open sewer'; however phase out of many of these mills should mean improved water quality. Similar progress will be seen in the Mohawk area because of heavy emphasis on sewage treatment combined with light industrial discharge. The Mid Hudson region, with a high natural assimilative capacity, will continue to experience good water quality if treatment is improved to accommodate a 46% population increase (332,000 people). The Lower Hudson Area will probably be burdened with deplorable water quality far into the future. The only hope for improvement rests in massive federal and state help to New York City and New Jersey communities and in rapid progress in cleaning up New Jersey industrial sources. (See also W74-09964) (LaPointe-North Carolina)
W74-09958

THE LOWER MISSISSIPPI,
R. Schwartz.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 175-186, 1973. 1 fig, 12 tab, 14 ref.

Descriptors: *Mississippi River, *Water quality, Water quality control, *Water pollution, *Biochemical oxygen demand, Watershed management, Water pollution treatment, Water pollution effects, Projections, Municipal wastes, Industrial wastes, Silt, Capital costs.
Identifiers: *Lower Mississippi River, *1980 water quality projections, St. Louis(Mo.), New Orleans(La).

The Mississippi River, 2,500 miles in length and draining an area of 1.2 million square miles, suffers from natural and manmade pollution. Silt discharges averaging 496,000 tons per day form the natural pollution. Until recently the volume of water in the Mississippi diluted wastes sufficiently to maintain a good water quality; however, proliferating industry and population discharging raw wastes have strained the assimilative capabilities of even this enormous river. Water quality was determined by erecting measuring stations at 6 points in the river: St. Louis, Mo.; Cape Girardeau, Mo.; West Memphis, Ark.; Vicksburg, Miss.; St. Francisville, La.; and New Orleans, La. Using population projections and estimated industrial growth, approximate BOD loads for the year 1980 were determined and compared with levels for 1960 and 1970. These figures show BOD loads well in excess of one billion pounds, with the industrial load slightly greater than 50% of the total. By 1980 loads will be more than 25% higher than

those of 1970. Taste and odor problems with drinking water, especially in the St. Louis area, have generated capital expenditures for sewage treatment facilities since 1963. However, as of 1969 only 30% of the industrial and municipal wastes received adequate treatment before entering the river. Over $1 billion will have to be invested before 1980 in industrial and municipal treatment facilities or severe problems, especially in St. Louis and New Orleans, will result. (See also W74-09964) (LaPointe-North Carolina)
W74-09959

SAVANNAH RIVER,
R. R. French.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 187-210, 1973. 1 fig, 9 tab, 21 ref.

Descriptors: *Water quality, Water quality control, *Biochemical oxygen demand, *Acidic water, Water pollution, Water pollution treatment, Water pollution effects, Shellfish farming, Pulp wastes, Pulp and paper industries, Fishing, Municipal wastes, Industrial wastes, Georgia, South Carolina.
Identifiers: *Savannah River, *1980 water quality projections, *Georgia Water Quality Control Board, Savannah(Ga).

The Savannah River, forming a 310 mile boundary between Ga. and S.C., is subject to severe pollution in the lower 28 miles around the city of Savannah, Ga. Water quality problems are (1) bacteria in mostly raw sewage primarily from the city of Savannah (population equivalent of 147,200), which have caused coliform concentrations as high as 62,000/100 ml and rendered much of the river unfit for bathing recreation; (2) oxygen demanding substances, 78% of which is discharged from the Union Bag-Camp Paper Corporation kraft mill (a population equivalent of 810,000); (3) settleable solids, again originating mainly from the kraft industry; and (4) acid wastes, mainly caused by an American Cyanimid titanium dioxide plant discharging upwards of 690,000 pounds of sulfuric acid per day. These problems have been aggravated to a point where daily minimum dissolved oxygen concentrations have dropped below 2.5 ppm at 75% of the monitoring stations, and 62.5% of the time pH measurements were below 6.5 reaching 4.2 on one occasion of a fishkill. This poor water quality has caused a steady decline in commercial fishing from an average of 22 million pounds for 1918 to 14 million pounds in 1968, a decline of 35.2%. To combat the worsening situation the Lower Savannah River Pollution Conference and the Georgia water quality control board established 85% BOD removal efficiencies for municipal wastes and paper mill wastes, 90% solids removal for industrial wastes, and pH standards for acid wastes (pH greater than 6.0 at any point more than 1,000 feet downstream of the discharge). Target date for completion of the program is Dec. 31, 1972. If the program is carried out on schedule the Savannah River should begin recovery in the 1970's. (See also W74-09964) (LaPointe-North Carolina)
W74-09960

LONG ISLAND WATER,
For primary bibliographic entry see Field 2F.
W74-09961

WATER RECYCLING IN SOUTHERN CALIFORNIA,
For primary bibliographic entry see Field 5D.
W74-09962

THE EFFECTS OF INCREASED PRODUCTION ON THE OCEANS,
F. D. Husson, Jr.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 257-280, 1973. 9 fig, 1 tab, 39 ref.

Descriptors: *Oceans, *Pollutants, *Mercury, *Oil pollution, *DDT, Ships, Offshore platforms, Methane bacteria, Continental shelf, Industrial pollution, Water pollution effects, Water pollution sources, Oceanography, Food chains.
Identifiers: LOT(Load on Top), Methyl mercury, Tankers, Minamata disease.

Most pollution into the oceans from the United States occurs on the Atlantic and Pacific continental shelves where water with large quantities of dissolves oxygen, microorganisms, and plants support a large portion of the bird and fish population. Current knowledge about three dangerous pollutants, petroleum, mercury, and DDT is examined. The major effect of oil pollution is the death of marine life via toxic materials in the oil or asphyxiation from direct coating. Oil finds its way to the sea from numerous sources. The flushing of storage tanks or tankers deposited approximately 2 million tons annually until a new innovation for emptying ballast water, the LOT (Load on Top) procedure, reduced this figure to 500,000 tons. Total employment of LOT is expected to reduce such pollution to negligible amounts. Other sources of oil pollution are merchant ships (500,000 tons per year), offshore wells (100,000 tons per year), refinery operations (300,000 tons per year), and industrial and automotive wastes (500,000 tons per year), not to mention the unknown amount from tanker accidents and offshore well seepage. Mercury can be transformed by the anaerobic methano-basterium omelanski into the poisonous methyl mercury. This compound causes the Minamata Disease which cripples and kills. It is estimated that 10,000 tons of mercury currently enter the oceans, half from man's activities. If this discharge is not eliminated widespread outbreaks of this disease are very possible. The effects of DDT on man are unknown but it is known to inhibit photosynthesis of single celled marine plants and cause abnormally thin shelled eggs in some birds. DDT tends to accumulate in the food chain producing very high concentrations in the higher trophic levels. A conservative estimate of 25,000 metric tons per year now enters the world's oceans. (See also W74-09964) (LaPointe-North Carolina)
W74-09963

SUMMARY OF FINDINGS CONCERNING WATER,
A. J. Van Tassel.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 281-294, 1973. 8 ref.

Descriptors: *Municipal wastes, *Industrial wastes, *Water pollution, *Water pollution sources, *Eutrophication, Nitrates, Phosphates, Biochemical oxygen demand, Lake Erie, Lake Michigan, Mississippi River, Hudson River, Sounds, Bays, Mercury, Oceans, Groundwater, Nutrients, Water supply, Waste water treatment.
Identifiers: *1980 water quality projections, Conclusions, Summary.

Two broad conclusions can be made from studies of Lake Michigan, Lake Erie, Puget Sound, San Francisco Bay, Long Island Sound, the Hudson, Savannah and Lower Mississippi Rivers and the water supplies of Long Island and Southern California as set forth in Chapters 2-13: (1) The rate of growth in the inputs of industrial pollutants in almost all of the waterways was greater than that attributable to population, and (2) the effluent of municipal sewage plants and specifically that portion beginning as household sewage was far and away the most important source of nutrients responsible for the phenomenom of overenrichment or eutrophication. The eutrophication process is well underway in Lake Erie but it is unlikely that any other large bodies of water such as those detailed in this book will reach advanced stages of eutrophication by 1980. It appears that, with the exception of nitrate and phosphate removal, more progress is being made with municipal wastes than industrial wastes; however recent funding assistance programs enacted by various states should lead to rapid progress in the control of industrial effluents. The major casualty has been water recreation, with much shoreline and bathing areas now placed off limits. The only major irreversible damage, due largely to bottom deposition of decaying vegetation capable of exerting massive oxygen demand far into the future, has been incurred by Lake Erie. The general outlook for the nation's waterways in light of likely massive federal funding is bright. (See W74-09953 thru W74-09963) (LaPointe-North Carolina)
W74-09964

THE ECOLOGICAL ASPECT OF FLUORIDE,
National Research Council of Canada, Ottawa (Ontario). Div. of Applied Biology.
J. R. Marier.
Fluoride. 5(2): 92-96. 1972.
Identifiers: *Ecological studies, *Fluorides, *Air-soil-water relationships, Air pollution, Water pollution, Soil contamination, Sulfur dioxide, *Ecosystems.

Examples are given of potential synergisms as they apply to air (between SO2 and fluoride), soil (between fluoride and potassium fluorobate in phosphate fertilizers) and water. Man's propensity to utilize the world's waterways as a catch-all for unwanted materials has led to possible synergism between fluorides and the multitude of waterborne pollutants. Finally, the intake of a pollutant (fluoride) in a biological organism (man) beset by nutritional inadequacy is discussed. These examples are related to air, soil and water pollution and their effect on the ecosystem.--Copyright 1973, Biological Abstracts, Inc.
W74-10002

WATER POLLUTION PREVENTION AND CONTROL--LIST OF TOXIC POLLUTANTS,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10060

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CONSTRUCTION OF MILLSTONE NUCLEAR POWER STATION, UNIT 3, MILLSTONE POINT COMPANY, ET. AL.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Rept. No. Docket 50423-80, $10.60/copy; $1.45 microfiche. Report No Docket 50423-80, February 1974. 401 p, 43 fig, 52 tab, 129 ref, 2 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Connecticut, Bays, Sounds.
Identifiers: *Pressurized water reactors, Niantic Bay, Long Island Sound, *Environmental impact statements.

The proposed Millstone Nuclear Power Station, Unit 3, will employ a pressurized water reactor and will be located in the town of Waterford, Connecticut, on Millstone Point. Cooling will be by a once-through flow of water from Niantic Bay which will be discharged through a Quarry Pond into Long Island Sound. Environmental impacts

are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue a construction permit subject to certain stipulated conditions relating to the impact of construction, landscaping techniques for screening, mortality of biota, ecological effects of discharge, surveillance and monitoring of area, and provide a course of action to alleviate irreversible damages. (Houser-ORNL)
W74-10109

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2, TENNESSE VALLEY AUTHORITY.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Docket No. 50438-63; $10.60/copy, $1.45/microfiche. Report No. Docket 50438-63 and 50439-63, June 1974. 336 p, 28 fig, 42 tab, 286 ref, 2 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Tennessee River, Alabama.
Identifiers: *Environmental impact statements, *Pressurized water reactors.

This final environmental statement relates to the issuance of construction permits for the Bellefonte Nuclear Plant Units 1 and 2. The plant will be located on the Tennessee River in Jackson County, Alabama, and will employ two pressurized water reactors cooled by natural-draft cooling towers with water from the Tennessee River. Environmental impacts are assessed and after consideration of alternatives, an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is for a construction permit to be issued subject to the following conditions: (1) an approved one-year sampling program, (2) acceptability of the proposed intake, and (3) certain restraints on use of herbicides. (Houser-ORNL)
W74-10111

RADIOLOGICAL MONITORING PROGRAM, PERIOD COVERING JULY 1, 1972, THROUGH SEPTEMBER 30, 1972, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Santa Fe, N. Mex. Dept. of Nuclear Sciences.
For primary bibliographic entry see Field 5A.
W74-10114

RADIOLOGICAL MONITORING PROGRAM: PERIOD COVERING APRIL 1, 1972, THROUGH JUNE 30, 1972, FOR CER GEONUCLEAR CORPORATION, PROJECT RIO BLANCO.
Eberline Instrument Corp., Santa Fe, N.Mex. Dept. of Nuclear Sciences.
For primary bibliographic entry see Field 5A.
W74-10115

WATER RESOURCE DEVELOPMENT AND ENVIRONMENT - AN APPROACH TO IMPACT ANALYSIS,
Waterloo Univ. (Ontario). Div. of Environmental Studies.
For primary bibliographic entry see Field 6G.
W74-10122

MATHEMATICAL MODEL OF THE BIOTIC CIRCULATION WITHIN THE LAKE ECOSYSTEM, (IN RUSSIAN),
Akademiya Nauk SSR, Leningrad. Institut Evolyutsionnoi Fiziologii i Biokhimii.
A. A. Umnov.
Gidrobiol Zh Vol 8, No 5, p 5-13, 1972. Illus. English summary.
Identifiers: *Biomass, Biotic circulation, Ecosystems, Lakes, *Mathematical models, Organic matter, *Productivity, Radiation, Solar, Temperature, *Pelagic lakes ecosystem, Phytoplankton, Zooplankton.

A mathematical model of pelagic lake ecosystem is proposed. The state of the ecosystem is determined by phyto- and zooplankton biomass, quantity of dead organic substance, quantity of stable organic substance (in the given model dead organic substance is considered together with bacterioplankton), and quantity of biogenic elements, dissolved in water and taking part in the ecosystem components enumerated above. The role of solar radiation and the thermal regime is considered. The comparison of modeling results with those obtained in the study of the ecosystem of the Mastro lake (USSR) showed good reliability of the model for description of dynamic processes in the lake ecosystems. The model was used for study of the effects of biogenic element concentration on seasonal biomass dynamics and zoo- and phytoplankton productivity.--Copyright 1973, Biological Abstracts, Inc.
W74-10126

BACTERIAL POLLUTION INDICATORS IN THE INTESTINAL TRACT OF FRESHWATER FISH,
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W74-10131

EFFECT OF CONSUMPTION OF SHAVINGS ON HEMATOLOGY OF TURKEY POULTS,
Georgia Univ., Athens. Dept. of Poultry Science.
K. W. Washburn, and O. W. Charles.
Poultry Science, Vol 52, No 3, p 1200-1201, May, 1973. 2 tab, 6 ref.

Descriptors: *Poultry, *Feeds, *Litter, *Diets, *Farm wastes.
Identifiers: Wood shavings, *Hematology, *Turkey poults, Basal, Folid acid, Mean cell volume, Erythrocyte count, Hemoglobin, Macrocytic anemia.

The effect of the consumption of new wood shavings on the hematology of turkey poults was studied. The experimental design consisted of four dietary treatments--(1) basal, (2) basal with wood shavings, (3) basal with added folic acid, and (4) basal with wood shavings and added folic acid. The shavings were fed from a feeder designed for determining individual feed efficiency. The average consumption of litter from those fed the basal diet was 291 grams, while those fed with folic acid added consumed 277 grams of shavings. The hematological parameters measured were: erythrocyto counts, mean cell volume, hemoglobin concentration, and mean cell hemoglobin concentration. No significant differences in the MCV or MCHC of any of the groups indicated that the shavings consumption did not affect the hemotology of turkey poults. (Cameron-East Central)
W74-10136

PSYCHROPHILES IN WASTE TREATMENT,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10176

DEVELOPMENT OF SAMPLE PREPARATION METHODS FOR ANALYSIS OF MARINE ORGANISMS,
Southwest Research Inst., Houston, Tex.
For primary bibliographic entry see Field 5A.
W74-10190

A STUDY OF BDELLOVIBRIO BACTERIOVORUS AS A BIOLOGIC FACTOR OF SELF PURIFICATION OF WATER BODIES, (IN RUSSIAN),
G. I. Sidorenko, G. A. Bagdasar'yan, Yu. G. Talaeva, R. M. Abieva, and Sh. I. Satdykov.
Gig Sanit. Vol 38, No 1, p 11-14, 1973. (English summary).
Identifiers: *Bacteria(Interal), *Bdellovibrio-bacteriovorus, Biological properties, Guinea pigs, Sewage, Streams, Virus, *Self purification, Mice, Toxicity.

Biologic properties of Bdellovibrio bacteriovorus, its distribution in streams and sewage and its role in the water purification process with respect to enteral bacteria and viruses are discussed. Several strains of Bdellovibrio were recovered from sewage and surface waters; their virulence for albino mice and guinea pigs, their toxicity for various lines to tissue cultures and their lytic action for saprophytic and phatogenic bacteria were studied.--Copyright 1973, Biological Abstracts, Inc.
W74-10204

EUTROPHICATION AND RECOVERY IN EXPERIMENTAL LAKES: IMPLICATIONS FOR LAKE MANAGEMENT,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. W. Schindler.
Science, Vol 184, No 4139, p 897-899, May 24, 1974. 2 fig, 21 ref.

Descriptors: *Phosphates, *Eutrophication, *Lakes, Experimentation, Canada, Nitrogen, Carbon, Great Lakes, Algae, Water management(Applied), Phytoplankton, Lake basins, Sediments, Water pollution control, *Canada, Detergents.
Identifiers: Phosphorus removal, *Ontario(Canada).

Experimentation on several small lakes in Ontario, Canada tested whether phosphorus alone is responsible for eutrophication problems and how quickly the lakes could recover after phosphorus removal. By adding phosphate, ammonia, and sucrose, rapid eutrophication occurred; but when phosphate additions were discontinued recovery was almost immediate. When two basins of one lake were fertilized with equal amounts of nitrate and sucrose, phosphorus was added to only one and it quickly became eutrophic. The basin with only nitrogen and carbon remained at prefertilization levels. The high affinity of sediments for phosphorus, coupled with these results, indicate that abatement of eutrophication can be expected to follow phosphorus control measures. Reducing phosphorus input should cause a proportional abatement in phytoplankton blooms and other forms of eutrophication. About fifty percent of the phosphorus which comes into the St. Lawrence Great Lakes could be eliminated by banning or greatly reducing detergent phosphates. (Prague-FIRL)
W74-10294

HIGH-LEVEL COPPER FEEDING OF SWINE AND POULTRY AND THE ECOLOGY,
Florida Univ., Gainesville.
For primary bibliographic entry see Field 5B.

W74-10295

CONSEQUENCES OF HIGH NITRATE LEVELS IN FEED AND WATER SUPPLIES,
South Dakota State Univ., Brookings. Dept. of Biochemistry.
R. J. Emerick.
Federation Proceedings, Vol 33, No 5, p 1183-1187, 1974. 77 ref.

Descriptors: *Water supply, *Potable water, *Nitrates, *Nitrites, *Toxicity, Livestock, Feed, Diets, Water quality control, Standards, Public health, *South Dakota, *Farm wastes, *Feeds.

Presently available data and lack of data justify caution with regard to nitrate and nitrite contents of food and water supplies for humans. Animal tests, however, indicate that subacute effects usually have occurred only with levels of nitrate and/or nitrite approaching those of being potentially acutely toxic. Feeds containing less than 0.1 percent NO3-N and waters containing less than 100 ppm NO3-N appear to within a safe range for all classes of livestock. Maximum amounts seem to depend upon the species of animal, the type and quantity of diet, and the time period over which the dose is consumed. (Prague-FIRL)
W74-10296

RENAL TUBULAR MORPHOLOGY IN THE CHANNEL CATFISH (ICTALURUS PUNCTATUS) KIDNEY,
Louisville Univ., Dept. of Anatomy.
M. W. Kendall, and D. E. Hinton.
Journal of the Fisheries Research Board of Canada, Vol 31, No 3, p 346-347, 1974. 6 fig, 8 ref. OWRR A-038-KY (5). 14-31-0001-3217, 14-31-0001-3517.

Descriptors: *Channel catfish, *Water pollution effects.
Identifiers: Renal tubular morphology, Kidney.

Kidneys of 50 channel catfish (Ictalurus punctatus) (25-30 cm long) obtained from a fish hatchery were subjected to light microscopic examination. All renal tubular segments generally found in freshwater teleost kidney were present. These included a ciliated neck segment, bisegmental proximal segment, ciliated intermediate segment, distal segment, and, in addition, collecting ducts. (Grieves-Kentucky)
W74-10318

FURTHER CONTRIBUTION TO THE STUDY OF NITRIFICATION IN THE SEA AND IN A BRACKISH WATER ENVIRONMENT (IN ITALIAN),
Messina Univ. (Italy). Istituto di Idrobiologia.
For primary bibliographic entry see Field 5B.
W74-10341

5D. Waste Treatment Processes

INSTITUTIONAL FACTORS IN THE CREATION OF LOCAL SANITARY DISTRICTS IN WISCONSIN,
Wisconsin Univ., Madison. Land Tenure Center.
H. Felstehausen, and E. Abbott.
Available from the National Technical Information Service as PB-233 787 $4.00 in paper copy, $1.45 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report, 1974. 83 p, 5 figs, 6 tables, 20 ref. OWRR A-042-WIS(1), 14-31-0001-3850.

Descriptors: *Water policy, *Political constraints, *Institutions, Governments, Contracts, *Administration, Legal aspects, Project planning, *Financial feasibility, *Environmental sanitation, Sewage treatment, *Wisconsin, Treatment facilities.
Identifiers: *Lake Koshkonong(Wisc).

The administrative, technical and financial requirements for building a community wastewater collection and treatment facility are presently so complex that local officials and citizens have little control over the scope or quality of service provided or the design and cost of the installation. This is because of extensive technical requirements and high capital costs--both requiring interlocking local, state and federal obligations--plus the sheer number of contracts, approvals, inspections, reviews, requisitions. orders and reminders required to manage a project. The administrative procedures of the Consolidated Koshkonong Sanitary District covering a five year period were located and tabulated to obtain an estimate of the complexity of a community public works undertaking. Research methodology and data handling procedures are described. The process involved 72 identified agencies and organizations and 333 identified officials and technicians. Approximately 5,000 administrative transactions took place. The scope of such an elaborate network of activity was beyond the capacity of the community--local control was replaced by technical control and standardized procedures. Homeowners in the district were surveyed during the final stages of construction to determine how they had participated, how they had learned about the project and if they had complaints.
W74-09811

SUMMARY EVALUATION OF CANDIDATE FLUID-BED SOLIDIFICATION PROCESSES FOR USE IN THE NWCF,
Allied Chemical Corp., Idaho Falls, Idaho. Idaho Chemical Programs Operations Office.
W. A. Freeby, D. W. Rhodes, S. S. Bodner, and D. G. Swink.
Aval: NTIS, Springfield, Va., as Rept. No ICP-1046; $4/copy, $1.45/microfiche. Report No. ICP-1046, April 1974. 30 p, 6 fig, 13 ref.

Descriptors: *Radioactive waste disposal, *Waste treatment, *Nuclear wastes, *Effluents, Chemistry, Chemical reactions, Research and development, Treatment facilities, Heating, Comparative benefits.
Identifiers: Waste management, Air fluidization, Off-gas recycle, Steam fluidization, Calcination.

Air fluidization, off-gas recycle, and steam fluidization are evaluated as process alternatives for the New Waste Calcining Facility. Emphasis was on the capability of each process to reduce radiochemical and chemical emissions to as low as practicable. The disadvantages of steam fluidization and off-gas recycle heavily outweigh any potential advantages. It is recommended that development efforts be concentrated on methods for increasing the efficiency of radionuclide removal from the off-gas based on air fluidization using in-bed combustion heating. (Houser-ORNL)
W74-09829

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Division of Waste Management and Transportation (AEC), Washington, D.C.
Aval: NTIS, Springfield, Va., as Rept. No. WASH-1297; $5.45/copy, $1.45/microfiche. Report No. WASH-1297, May 1974. 105 p, 24 fig, 14 tab, 5 ref, 1 biblio.

Descriptors: *Radioactive waste disposal, *Research and development, Environment, *Environmental effects, *Waste treatment, Geologic formations, Land, Oceans, Seas, Ice, Waste storage, Economics, Degradation(Decomposition), Decay, Stabilization, Equilibrium.
Identifiers: Outer space, Bedded salt, *Hydraulic fracturing, *High-level wastes, Transmutation.

This report is the summary of a comprehensive overview study of potential alternative methods for long-term management of high-level radioactive waste. The study includes a compilation of information relevant to technical feasibility, safety, cost, environmental considerations, policy conflicts, public response and research and development need for: (1) Disposal in terrestrial locations - (a) In geologic settings on land; (b) In the seabed; (c) In ice sheets. (2) Disposal into space. (3) Elimination by transmutation (nuclear transformation of certain waste constituents into nuclides having less long-term toxicity). The study is limited to the management of high-level radioactive waste from nuclear power by variations of these alternatives. (Houser-ORNL)
W74-09839

ICE MELTING EXPERIMENTS--A MODEL STUDY FOR BURIAL OF RADIOACTIVE WASTES,
Sandia Lab., Albuquerque, N.Mex.
H. C. Hardee, and W. N. Sullivan.
Available from NTIS, Springfield, Va, as Rept No SLA-73-0942; $4.00/copy, $1.45 microfiche.Report No SLA-73-0942, January 1974. 37 p, 26 fig.

Descriptors: *Radioactive waste disposal, Management, Research and development, Heating, Heat transfer, Model studies, *Melt water, *Melting, Ice, *Waste treatment.
Identifiers: *Waste burial.

Burial of radioactive wastes in the ground has been suggested as a disposal method. If a buried radioactive source releases heat in excess of a certain minimum value, the ground or rock surrounding the source will eventually melt. The ability to predict the melt rate and the shape of the melted cavity is important in determining whether such materials can be safely disposed of underground. To study the problem, some simple model melting experiments were run with cylindrical and spherical heat sources in ice. Cases were studied in which convective effects were both important and negligible. (Houser-ORNL)
W74-09868

ADDITIONAL HIGH LEVEL WASTE FACILITIES--SAVANNAH RIVER PLANT, AIKEN, SOUTH CAROLINA, (DRAFT ENVIRONMENTAL STATEMENT).
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-09873

MANAGEMENT OF SOLID RADIOACTIVE WASTES,
Atomic Energy Commission, Washington, D.C.
A. F. Kluk, and D. T. Wong.
Chemical Engineering Progress, Vol 70, No 4, p 85-86, April 1974. 1 tab, 6 ref.

Descriptors: *Radioactive waste disposal, *Waste storage, Movement, *Soil contamination, *Water pollution, Leakage, Ion transport, Sorption, Groundwater, Uranium, Plutonium.
Identifiers: *Waste management, *Waste burial, *Burial grounds, Waste handling.

Current waste handling practices, waste treatment, burial ground stabilization programs, pilot experiences are described and cost information is provided. Three types are described as follows: (1) Fission product/induced activity (FP/IA) contaminated wastes containing primarily beta-gamma emitters. (2) Uranium (U) wastes contaminated with low-hazard alpha emitters. (3) Transuranic (TRU) wastes contaminated with long-lived, high-hazard, alpha emitters. The first two categories of solid waste can be safely stored in controlled, near-surface, burial areas where very limited migration of radioactivity occurs. Monitoring programs have confirmed that essentially no migration of radioactivity has occurred from currently acceptable burial areas. The principal AEC burial sites are the Los Alamos Scien-

tific Laboratory (LASL) in New Mexico, the National Reactor Testing Station (NRTS) in Idaho, the Oak Ridge National Laboratory (ORNL) in Tennessee, the Richland Site in Washington, and the Savannah River Plant (SRP) in South Carolina. A total of about 964,000 cubic meters of solid radioactive waste has been stored at these sites, on 185 hectares of land. Total current annual additions at the principal sites are shown. The bulk of the TRU- contaminated wastes, in terms of both volume and contained radioactivity, is generated at Rocky Flats and shipped to the NRTS for retrievable storage. (Houser-ORNL)
W74-09874

RADIOACTIVITY IN SURFACE AND COASTAL WATERS OF THE BRITISH ISLES, 1971,
Ministry of Agriculture, Fisheries and Food, Lowestoft, (England). Fisheries Radiobiological Lab.
N. T. Mitchell.
Available from NTIS, Springfield, Va., as Rept No FRL-9; $4/copy, $1.45/microfiche. Report No FRL-9, July 1973. 39 p, 1 fig, 27 tab, 41 ref.

Descriptors: *Radioactive waste disposal, *Oceans, *Monitoring, *Aquatic environment, Effluents, Nuclear powerplants, Coasts, Seashores, Water law, Regulations, Standards, Water pollution, Water pollution sources, Fallout, Background radiation, Radioisotopes, Toxicity, Public health.
Identifiers: *United Kingdom(English Channel), *Coastal waters.

The stringent standards set to limit disposal of radioactive waste in the United Kingdom have been maintained, and as a consequence radiation exposure of the public is very low and well within the recommendations of the International Commission on Radiological Protection and dose limits specified in the objectives of UK waste disposal policy. Data presented show that this high standard of compliance continues, and that the exacting requirements of the ICRP recommendations are not merely met but that, in all disposals, radiation exposure of the public is well within the prescribed dose limits and in many instances is very much less. The situation is recorded as it existed at all major sites from which waste is discharged. (Houser-ORNL)
W74-09875

INVESTIGATION AND EVALUATION OF 102-BX TANK LEAK,
Atlantic Richfield Hanford Co., Richland, Wash. Engineering Dept.
For primary bibliographic entry see Field 5B.
W74-09877

RADIOACTIVE WASTE MANAGEMENT INFORMATION: 1972 SUMMARY AND RECORD-TO-DATE.
Idaho Operations Office (AEC), Idaho Falls.
For primary bibliographic entry see Field 5B.
W74-09880

THERMAL DISCHARGES--PROBLEMS AND OPPORTUNITIES,
Division of Biology and Medicine (AEC), Washington, D. C.
R. F. Reitemeier.
Journal of Environmental Quality, Vol 2, No 2, p 178-179, April-June 1973. OWRR A-011-ORE (1)

Descriptors: *Recycling, *Thermal pollution, Industrial wastes, Farm wastes, Municipal wastes, Pollution abatement, Heated water, Cooling water, Waste treatment, Waste disposal, Powerplants.
Identifiers: *Waste heat.

About 50% of the total energy output from fossil fuel plants and 66% of the output from light-water nuclear plants is rejected as heat in the condenser cooling water. The addition of thermal energy to a body of water may, depending on the specific circumstances, alter the local environment, modify ecosystems by effects on temperature-sensitive components, and affect its usability by people as a food and water supply and recreation resource. Some effects may be considered either deleterious or advantageous depending on local conditions, viewpoints, and interests. Such water may help to increase the yield of plant and animal products. Agricultural applications could include: the warming and irrigation of cropland to lengthen the growing season and increase yields; the spraying of fruit trees to reduce injury from cold; the heating and cooling of greenhouses and animal shelters, and the microbiological processing of crop and animal wastes. Potential applications in aquaculture include increased growth rates of finfish and shellfish and the production of algae from vegetable wastes, (Knapp-USGS)
W74-09888

INTEGRATED SYSTEMS FOR UTILIZING WASTE HEAT FROM STEAM ELECTRIC PLANTS,
Oregon State Univ., Corvallis. Dept. of Soil Science.
L. Boersma, and K. A. Rykbost.
Journal of Environmental Quality, Vol 2, No 2, p 179-187, April-June 1973. 6 fig, 9 tab, 29 ref.

Descriptors: *Recycling, *Thermal pollution, Industrial wastes, Farm wastes, Municipal wastes, Pollution abatement, Heated water, Cooling water, Waste treatment, Waste disposal, Powerplants.
Identifiers: *Waste heat.

Multiple use of waste heat and cooling waters from power plants will become an important consideration in the development, siting and certification of these plants. The heat in the cooling water must be considered a resource to be managed for effective use. Pollution problems such as disposal of agricultural and domestic sewage, thermal pollution, and persistent chemicals must be solved in concert, not individually. The ultimate solution to these problems must be found in the development of integrated systems in which resources are recycled. A system of components is proposed to beneficially utilize waste heat, allow multiple use of the cooling water, and achieve a high degree of efficiency in the production of food and fiber without causing polluted streams and soils. The concept fits anticipated trends in agriculture where a higher rate of production per unit area must be achieved for economic reasons and to avoid some of the ecological impact. It allows the wise land-use planning which is rapidly emerging as a major national issue. (Knapp-USGS)
W74-09920

HEAT BUDGET OF COOLING BASINS,
Oregon State Univ., Corvallis. Dept. of Mathematics.
F. T. Lindstrom, and L. Boersma.
Journal of Environmental Quality, Vol 2, No 2, p 197-203, 1973. 4 fig, 5 tab, 2 ref. OWRR B-019-ORE (5).

Descriptors: *Recycling, *Thermal pollution, *Ponds, Heat transfer, Evaporation, Water temperature, Cooling water, Powerplants, Heat budget.
Identifiers: *Waste heat, *Cooling basins.

A system of open water basins is proposed for beneficial use of heated discharges from thermal power stations while at the same time providing a heat sink. Large, shallow compartments are filled with water which is well mixed, while cooling water is pumped through conduits below the basins. They might be used for the production of single-cell protein and fish. Equations were derived for the temperature distribution in the warm water conduit and basins of the system used in conjunction with a 1000-megawatt electric powerplant. The rate of heat loss at the air-water interface may vary widely as a function of windspeed and relative humidity. The surface area of basins required may vary from about 100 ha to over 500 ha. For a constant surface area of the basins the temperature of the cooling water would fluctuate as a result of changing rates of heat loss. It might be difficult to develop commercial uses for a large number of basins. Use of such basins in conjunction with other methods of heat dispersion is therefore suggested. (Knapp-USGS)
W74-09922

ECOLOGICAL MANAGEMENT OF THERMAL DISCHARGES,
California Univ., Berkeley. Dept. of Sanitary Engineering and Public Health.
W. J. Oswald.
Journal of Environmental Quality, Vol 2, No 2, p 203-207, 1973. 2 fig, 1 tab, 13 ref. OWRR A-011-ORE (1).

Descriptors: *Recycling, *Thermal pollution, *Cooling water, *Water reuse, Sewage treatment, Powerplants, Water temperature, Algae, Fermentation, Waste treatment.
Identifiers: Waste heat.

Heat from thermal discharges may improve sewage, animal and vegetable waste treatment processes. With sufficient heat, human, animal, and vegetable wastes may be subject to methane fermentation and algal growth the year around. Algae produced on human and animal waste may be used for livestock feed. The algae produced on vegetable wastes may be processed for human food. Following algae production, the waste water is hygienic and suitable for parks. The rate of anaerobic fermentation in ponds increases 30-fold between 15C and 35C. The most promising algae, Scenedesmus quadricauda, grows best at 20C. Waste decomposition and protein production rates exceed 100 times those normally found in nature. Algae ponds gain and lose heat at rates exceeding those found in ponds free of algae. Calcium and magnesium removal in algal ponds reaches 50% of influent. (Knapp-USGS)
W74-09923

CONCEPTUAL DESIGN OF A FLOOD COMPLEX USING WASTE WARM WATER FOR HEATING,
Oak Ridge National Lab., Tenn.
S. E. Beall.
Journal of Environmental Quality, Vol 2, No 2, p 207-215, 1973. 5 fig, 3 tab, 21 ref.

Descriptors: *Cooling water, *Water reuse, *Thermal pollution, Water pollution control, Recycling, Farms, Crops, Livestock, Waste water treatment, Powerplants.
Identifiers: *Waste heat.

How the heat in waste warm water from electric generating plant condensers can be transferred economically to controlled environments, such as in greenhouses or animal enclosures, and how the heat exchange system could be applied to an intensive food production complex which might be constructed near a power station are discussed. A heat-using complex might consist of enclosures for fish, poultry, swine, and vegetable plants. An abundance of heat in the form of warm water is being produced and discharged as waste from air-conditioning systems, industrial processes, and electric power stations. The temperature of the water is climate dependent but is usually 11.1C or more above natural water temperature and is often 37.8C or warmer even in the coldest months. At plants where cooling towers are installed, the water temperature will be 5.6C to 16.8C warmer than for once-through cooling. (Knapp-USGS)
W74-09924

SIMULATION MODEL TO STUDY THE UTILIZATION OF WASTE HEAT USING A COMBINATION MULTIPLE RESERVOIR AND GREENHOUSE COMPLEX,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
D. R. Price, and R. M. Peart.
Journal of Environmental Quality, Vol 2, No 2, p 216-224, 1973. 9 fig, 5 tab, 5 ref.

Descriptors: *Water reuse, *Heated water, *Cooling water, Recreation, Reservoirs, Farms, Aquiculture, Powerplants, Recycling, Water temperature.
Identifiers: *Waste heat, Heat exchange.

A system was designed to utilize waste heat discharged by the cooling condenser of a steam-electric generating station using systems analysis techniques. Multiple reservoirs are proposed for storage, utilization, and dissipation of the thermal discharge from a 1000-megawatt generating station. One reservoir is used for storage of the warmest water to be used for heating of a greenhouse located adjacent to the reservoir. A second reservoir is included and used for commercial fish production, while another is used for recreational purposes and provides the necessary cooling capacity for summer cooling. Mathematical models describe the heat exchange characteristics of the reservoirs and greenhouse. Operating ranges were determined for the various components of the system. The simulator was used to study the operation of the system throughout a 1-year period. A 2,500-acre recreational lake, up to 500 acres of reservoir for fish production, and up to 350 acres of greenhouse make up a feasible system design. (Knapp-USGS)
W74-09925

WATER RECYCLING IN SOUTHERN CALIFORNIA,
J. Carmichael.
In: Our Environment: The Outlook for 1980, Part 1. Our Environment: Water. Ed. by A. J. Van Tassel, Lexington Books, Lexington, Mass., p 237-255, 1973. 10 tab, 13 ref, glossary.

Descriptors: *Water supply, *Water reuse, *Water management(Applied), *Water conservation, *Water costs, Water importing, Waste water treatment, Aqueducts, Desalination, Growth rates, Groundwater, *Recycling, Industrial water, Recreation, *California, Colorado River Aqueduct, Irrigation.
Identifiers: *1980 water quality projections.

With rainfall averaging less than 15 inches a year, Southern California must rely heavily on importation of water. The Metropolitan Water District of Southern California (MWD), charged with the development, storage, transportation and vending of water, has been forced to import large quantities of water from the Colorado River, 300 miles away, and from Northern California via the Los Angeles Aqueduct. Importation costs have risen from $15 to $57/acre foot over the past 30 years, and are expected to reach $75/acre foot by 1980. Compounding the problem has been rapid population growth, from 3.5 million in 1940, 8.8 million in 1960 to 11 million in 1969, and projected to reach almost 17 million by 1980 when water demand is expected to be 3.29 million acre feet. Water supply should be ample to meet this growth especially upon completion of the 3 million acre feet Oroville Dam north of Sacramento. Although this will mean increased import costs, the affluent nature of the population minimizes this financial disadvantage. In this area where water recreation is widespread, use could be made of wastewater currently being dumped into the Pacific Ocean. Cost estimates show that such wastewater could be reclaimed for $11.05/acre feet. Recreation, irrigation, and industrial applications are potential uses. Reclamation plants, e.g. Santee County, which reclaims 60 to 80% of imported water for recreational uses, and Whittier Reclamation Plant, which processes 12 MGD for ground water recharge at a cost of $9 per acre foot, demonstrate the economic benefits the region could derive from wastewater reclamation . (See also W74-09964) (LaPointe-North Carolina)
W74-09962

AREAWIDE WASTE TREATMENT MANAGEMENT PLANNING IN THE WASHINGTON METROPOLITAN REGION: 1972 AMENDMENTS TO THE FEDERAL WATER POLLUTION CONTROL ACT, SECTION 208.
Potomac Basin Reporter, Vol 30, no 2, p 1-4, February 1974.

Descriptors: *Interstate rivers, *Impaired water quality, *Waste water treatment, *Project planning, *Water pollution, Water quality control, Water sources, Inter agency cooperation, Federal government, Environment, Water pollution sources, Water pollution control, Water demand, Sewage treatment, Legislation, Discharge, Discharge measurement, Technology, *District of Columbia.

Section 208 of the Federal Water Pollution Control Act was included by Congress to encourage and facilitate regional waste treatment management in major growth areas and to formulate a continuing plan to allow for pollution abatement. Outlined first are the legal requirements which must be met to have the planning process applied to an interstate area and the criteria used in designating these areas. In order to meet Environmental Protection Agency (EPA) planning strategy, plans must be directed toward two primary objectives in general. The first is to achieve the best practicable waste treatment technology for public sources and the best available control technology for non-public sources. The second objective is to eliminate discharges by 1985 if practicable and economically feasible. Planning needs for the Washington metropolitan area are discussed and several recommendations are set forth concerning area waste water treatment. Public participation is felt to be essential as the problems will be extensive and complex. (Sutton-Florida)
W74-09973

PRESIDENT'S MESSAGES: VETO OF H.R. 3298--RURAL WATER AND SEWER GRANTS.
For primary bibliographic entry see Field 6E.
W74-09987

RULES PERTAINING TO STANDARDS FOR SUBSURFACE SEWAGE AND NON-WATER-CARRIED WASTE DISPOSAL.
Oregon State Dept. of Environmental Quality, Portland.
For primary bibliographic entry see Field 5E.
W74-09993

WASTE TREATMENT FUND ALLOCATIONS.
For primary bibliographic entry see Field 6E.
W74-09996

WASTE TREATMENT FUND ALLOCATIONS--LEGISLATIVE HISTORY.
For primary bibliographic entry see Field 6E.
W74-09997

THE UNCERTAIN SEARCH FOR ENVIRONMENTAL POLICY: THE COSTS AND BENEFITS OF CONTROLLING POLLUTION ALONG THE DELAWARE RIVER,
Pennsylvania Univ., Pa.
For primary bibliographic entry see Field 5G.
W74-09999

PRETREATMENT STANDARDS FOR SEWERAGE.
For primary bibliographic entry see Field 6E.
W74-10006

HIGH-RATE FILTRATION,
CH2M/Hill, Corvallis, Oreg.
A. H. Rice.
Journal of the American Water Works Association, Vol 66, No 4, p 258-261, April, 1974.

Descriptors: *Filtration, *Clarification, *Water quality, *Filters, Water temperature, Effluents, Suspended solids, Flocculation, Head loss, Silica, Design criteria, Water treatment, *Waste water treatment.
Identifiers: Polyacrylamides, High rate filtration, Floc penetration, Anthracite coal, Filter-media.

High filtration rates for improved filtered-water clarity are a trend in industry. Practices of filtration vary widely because of a number of variables in design and mechanisms of filters. Filters become steadily finer as materials deposit and head loss increases exponentially. By being sure that filter-media grain size is too large to permit straining to occur, this is prevented; and removal is therefore by chance adhesion of the relatively small suspended particles onto the relatively large surface of the filter media or previously deposited material. Flow rate, kind and amount of suspended solids, desired effluent quality, and water temperature are the major variables in filtration. Depth of filter and media size also influence head-loss, floc penetration, and water quality. The majority of United States water-filter plants use a sand filter. Dual media filters with anthracite coal and three-media filters with garnet or ilmenite are described. In the use of multi-media filtration, materials with different specific gravities are necessary, and the materials must be relatively inexpensive and durable under filter conditions. An additional problem in filtration, seasonal variation of floc, has been solved. Polyacrylamides and activated silica as floc-strengthening agents are a necessary part of new methods of high-rate filtration. (Prague-FIRL)
W74-10015

FACTORS IN REGIONAL ASSESSMENT OF WASTEWATER REUSE,
Camp, Dresser and McKee, Boston, Mass.
D. R. Horsefield.
Journal of the American Water Works Association, Vol 66, No 4, p 238-239, April, 1974.

Descriptors: *Water reuse, *Waste water disposal, *Recycling, *Cooling water, Water quality, Standards, Water supply, Planning, Costs, Domestic water, Groundwater, Recharge, Agriculture, Recreation, Industrial wastes, Diseases, Electricity, Effluents, Power plants, Texas, Reclamation, *Regional analysis.
Identifiers: *Texas Water Plan.

Feasibility of waste water reuse in any region should be evaluated on the basis of specific local conditions of quality, quantity, and economics. The North Central Texas Council of Governments assessed their area by asking what the needs for present and future supplemental water supplies were, what the best method of reuse for the region might be, what the potential markets for renovated waste water were, and what water quality criteria for beneficial uses needed to be. The Texas Water Plan is long range and takes into account methods of water reuse aside from domestic reuse twenty years from now. These include groundwater recharge, agricultural irrigation, recreational lakes, industrial process water, and cooling water. Disease prevention is foremost as a consideration. The only currently marketable method of the five above is cooling water for steam-electric power plants. If these operate at capacity, for 1990, with recycled cooling water (high quality effluent), the make-up requirement could be reduced by up to 40 fold. Advantages of waste water reclamation are in economics and in long-range planning. (Prague-FIRL)
W74-10016

SELECTING MIXERS FOR TREATMENT OPERATIONS,
Philadelphia Mixers Corp., Pa.
R. L. Winter.
Journal of the American Water Works Association, Vol 66, No 4, p 262-264, April, 1974. 5 fig.

Descriptors: *Mixing, *Water treatment, *Waste water treatment, *Design criteria, Costs, Liquids, Solids, Biological treatment, Tertiary treatment, Industrial wastes, Lime, Waste water treatment, Separation techniques, Equipment, Hydrogen ion concentration.
Identifiers: *Mixers.

Designs for mixers in water treatment and waste treatment vary according to particular applications but basic operating principles are the same. Waste treatment is broken down into primary, secondary, and tertiary treatment. Primary treatment removes solids with the aid of some type of liquid-solid separation mechanism. In secondary treatment, a biochemical process is usually involved to get rid of undesirable bacteria and other imputities. In tertiary treatment, this water is converted to a reusable state. Mixers are used for each phase, and vary in speed as well as size. An additional application of mixers in industrial operations is in automatic control of pH value of waste water by a response valve which allows control of the flow of lime. Costs and flexibility determine the type mixer for any application. Factors for consideration are speed changes, power changes, impeller changes, gear-reducer load ratings, and agitator and support bearings. (Prague-FIRL)
W74-10017

SHEAR-RESISTANT FLEXIBLE PIPE JUNCTION FOR SEWERAGE AND DRAINAGE.
Hoechst Australia Ltd., Melbourne.
For primary bibliographic entry see Field 8A.
W74-10019

SLUDGE BLANKET FOR WATER TREATMENT.
Standard Telephones and Cables Pty. Ltd., Alexandria (Australia).
Australian Patent 445,755. Issued November 4, 1969. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 7, February 28, 1974.

Descriptors: *Sludge, *Water treatment, *Patents, Liquids, Waste water treatment.
Identifiers: *Sludge blanket, Floc-suspension.

Water treatment is achieved using chemical agglomeration of impurities followed by separation of the chemically formed floc-suspension by filtration. A fully fluidized sludge blanket is comprised of sludge concentrator compartment, overflow openings, and walls of substantially cylindrical vessels arranged horizontally. A slot along the whole length of the lower part of the sludge blanket connects to a distribution channel for the treated liquid. (Prague-FIRL)
W74-10020

CIRCULATION SYSTEM WATER PURIFICATION - BY TREATMENT WITH AMMONIA SUBSEQUENTLY RECOVERED BY MEANS OF ION EXCHANGE RESIN,
A. M. Koganovskii, V. D. Semenyuk, and G. S. Chepurnaya.
Soviet Patent 365,326. Issued June 6, 1973. Soviet Inventions Illustrated, Section J-Chemical, (U49), January 10, 1974.

Descriptors: *Waste water treatment, *Recycling, Recirculated water, *Water reuse, *Ion exchange, *Resins, Filtration, Ammonia, Municipal wastes, *Patents.

The purification of a circulation water system by treatment with ammonia and its recovery by an ion exchange resin are described. The process is simpler and more economical than the conventional treatment with alkalis, which results in periodical discharge of water when the content of chemicals exceeds the admissible level (thus chemicals are lost). Ammonia is recovered in the H-form on cationic filters which are regenerated by washing with nitric acid. Water is then neutralized by passing through an OH-ionite filter, regenerated with ammonia water. The filter washing solutions can be used as liquid fertilizers. For example, water loss in a recirculation system is replenished with river water, which is treated with ammonia in an amount of 40 milligrams/liter milligram equivalent of the temporary hardness. The pH rises to 9.5-10, and calcium carbonate, magnesium hydroxide, and ferric hydroxide are precipitated. Ammonia is recovered on a H-cationite filter. A part of the water that passed through this filter (1/3-1/5) is directed to an OH-anionite filter. The regeneration of both filters is carried out with 25 percent nitric acid or 10 percent ammonia solution, respectively. (Merritt-FIRL)
W74-10021

SEWAGE TREATMENT PLANT - USING COMBINED FLOCCULATION AND AERATION.
IMB Netherlands, Amsterdam.
Netherlands Patent 7,217,163. Issued December 3, 1973. Netherlands Patents, Food, Disinfectants, Detergents (451), p 1, January 24, 1974.

Descriptors: *Sewage, *Waste water treatment, *Flocculation, *Aeration, Treatment methods, Recycling, *Patents.

A sewage treatment plant is described which combines flocculation and aeration. The raw sewage and a flocculating agent are fed into the inlet chamber of the plant together with some recycled liquid and a bleed fraction from the main compressed air line. The resultant mixture overflows a weir and goes into a preseparation and flocculation tank with an internal convection circuit. On the surface is a floating plastic inlet nozzle and manifold assembly which is connected to the suction side of a pump. It feeds the extracted liquid into a pressure vessel whose lower part is a set of air distributor nozzles fed by the main compressed air line. The resultant air-saturated liquid is expelled by the pressure build up into sets of distributor nozzles in the final separation tank of the plant. The air raises the flakes to the surface where they are trapped and the clear effluent is drained via a baffled compartment from the base of the separator tank. The nozzles for the super-aerated liquid are in two tiers, those above having higher mass flow than those below. There is a relatively high treatment capacity and high purification efficiency in terms of extraction of those dissolved impurities which are bonded by the flocculation agent. (Merritt-FIRL)
W74-10022

HYDRAULIC SEWER PIPE LINE CLEANER,
Conco Inc., Mendota, Ill.
For primary bibliographic entry see Field 8C.
W74-10023

METHOD AND MEANS OF CONTROLLING DEPOSITION OF PARTICLES IN A LIQUID,
D. A. Woodhouse.
Australian Patent 445,189. Issued February 14, 1974. Official Journal of Patents, Trade Marks, and Designs, Vol 44, No 5, p 483, February 14, 1974.

Descriptors: *Liquids, *Coagulation, *Patents, Flow, Zeta potential, Electrochemistry, Australia, *Waste water treatment, Deposition(Sediments).
Identifiers: *Electromagnetic force, Deposits.

A method of treating a liquid to promote coagulation of particles in the liquid is described. A self-induced e.m.f. is produced at a section of a supply conduit through which the liquid flows. It is effective to alter the Zeta potential of particles and ions present in the liquid contained in or passing through that section of the conduit. (Merritt-FIRL)
W74-10024

METHOD AND FILTER MEDIA FOR THE TREATMENT OF SEWAGE AND WASTE WATERS,
J. M. Choun.
Canadian Patent 938,226. Issued December 11, 1973. Patents/Brevets, p 3923, December 11, 1973.

Descriptors: Sewage, *Waste water treatment, *Filtration, *Aerobic treatment, Filters, *Patents.

A method and filter media for the aerobic treatment of sewage and wastewaters using a trickle filter are described. The filter media consists of thin wall capsules or shells of polymeric resin of sufficient regidity as to be self-supporting in the filter bed. The shells are reticulated by comparatively large diameter openings which permit a trickling flow of liquid and a free circulation of air both about and within the capsules. The structural arrangement of the filter media permits the filtering process to include the steps of forming both small puddles and unwetted portions throughout the filter media. A small amount of anaerobic activity apparently occurs within the puddles, and psychoda flies, finding dry perching places, live within the filter media itself. These combined factors result in a more effective filter media and better performance by the media. (Merritt-FIRL)
W74-10025

DRAINAGE GRATING,
For primary bibliographic entry see Field 8A.
W74-10026

PROCESS FOR REMOVING PROTEIN FROM WASTE EFFLUENT.
Tasman Vaccine Lab., Melbourne, (Australia).
Australian Patent 445,712. Issued July 14, 1969. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 7, p 682. February 28, 1974.

Descriptors: *Patents, *Effluent, *Proteins, Wastes, Waste water treatment, Ion exchange, Liquids.
Identifiers: Hydroxyl groups.

A substantially protein-free liquid is recovered after passing waste effluent through a bed or beds of ion exchange material, and regenerating the ion exchange material for future use. These ion exchange groups are cross-linked by the residues of a cross-linking agent which is bifunctional and capable of reacting with two hydroxyl groups to form covalent bonds. (Prague-FIRL)
W74-10027

FILTER AND SLURRY METERING SYSTEM,
Stauffer Chemical Co., N.Y.
J. A. King, and D. R. Maxam.
Canadian Patent 944,590. Issued April 2, 1974. Patents/Brevets, Vol 102, No 14, p 1165, April, 1974.

Descriptors: *Filters, *Slurries, *Patents, *Measurement, Circulation, Weight, *Canada, *Waste water treatment.

A system for measuring the solids content on a dry basis in a filter aid water slurry and pumping the filter aid back into a filter is described. The system circulates the filter aid water slurry through a density gauge and flow meter to measure the dry weight of solids. Then, the slurry is pumped back into the filter for reuse. (Merritt-FIRL)
W74-10028

FILTER FOR PURIFICATION OF EFFLUENTS COMPRISING PLANTS EMBEDDED IN GRAVEL/SAND FILTER BED.
German Patent 1484-841. Issued February 21, 1974. German Patents Abstracts, Vol 5, No 9, p 1, April, 1974.

Descriptors: *Filters, *Effluents, *Plant groupings, *Patents, *Bulrushes, Methodology, Waste water treatment, Filtration.

Plants are embedded into the filter medium, that being either gravel or sand devoid of nutrients, in such a way that their roots extend parallel to the direction of flow of the effluents through the filter medium. An aerator supplies fine bubbles below some of the roots. The preferred plants are plaited bulrushes. (Sandoski-FIRL)
W74-10031

DESIGN AND PERFORMANCE OF CHLORINE CONTACT TANKS,
Illinois State Water Survey, Urbana.
V. Kothandaraman, and R. L. Evans.
Illinois Department of Registration and Education, Circular No 119, 1974. 36 p, 13 fig, 19 tab, 17 ref.

Descriptors: Hydraulics, *Chlorine, *Model studies, Flow characteristics, Air, Solids, *Design criteria, Bacteria, Water purification, *Waste water treatment, *Water treatment.
Identifiers: *Chlorine contact tanks, Split chlorination, Solids accumulation, Baffled contact tanks.

Most existing chlorine contact tanks suffer from serious drawbacks of dead spaces, short circuiting, and solids accumulations. These putrefy and exert undue chlorine demand. Hydraulic model studies of chlorine contact tanks indicate that air agitated, baffled contact units have better flow characteristics than just baffled units or air agitated contact tanks without baffles. Air agitation does not result in a loss of total chlorine residuals, and it improves the bactericidal efficiency of chlorination. Air agitation eliminates the problems caused by solids accumulation in the contact units. Split chlorination does not appear to be an advantageous modification in chlorination practice. (Prague-FIRL)
W74-10035

SOLUBILITIES OF CALCIUM SULFATE DIHYDRATE AT 25C IN BRACKISH WATERS AND THEIR CONCENTRATES: EFFECT OF CALGON ADDITIVE AND PREDICTIONS FOR REVERSE OSMOSIS PROCESSES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 3A.
W74-10036

DEVELOPMENT OF A MONITOR FOR RECYCLE OF WASTE WATER,
Amicon Corp., Lexington, Mass.
H. Scharen, and T. W. Mix.
Available from the National Technical Information Service as AD771 975, $4.25 in paper copy, $1.45 in microfiche. Annual Report for period of December 1, 1972 to August 15, 1973, November, 1973. 42 p, 11 fig, 4 ref. DADA 17-72-C-2169.

Descriptors: *Monitoring, *Reverse osmosis, *Recycling, Flux, Membranes, Water purification, Spectrophotometry, Research, Tracers, Dyes, Salts, *Waste water treatment, *Filtration.
Identifiers: *Ozonation, *Ultrafiltration, Dichromate oxidation, Dichromates.

In a pilot eight-month study, a Reverse Osmosis (RO) unit was set up and RO membranes were tested for flux and salt rejection. Ultrafiltration and ozonation studies were performed on various dyes to check their suitability as candidate tracer material for the various purification steps of the recycle water. Efforts were undertaken to decide whether each step must be monitored individually. Efforts were concentrated on a feasibility study of dichromate oxidation in acid mediums as a monitoring technique, using a spectrophotometer to study the reaction between organic impurities in water and dichromate. (Prague-FIRL)
W74-10037

SELECTED ABSTRACTS FOR INSTRUMENTATION AND AUTOMATION OF WASTEWATER FACILITIES,
Raytheon Co, Portsmouth, R.I. Environmental Systems Center.
A. E. Molvar, and J. F. Roesler.
Available from the National Technical Information Service as PB-225 520, $7.00 in paper copy, $1.45 in microfiche. 1973. 309 p. EPA 17110.

Descriptors: *Instrumentation, *Automation, *Publications, Costs, Waste water treatment, Storm water, Flow measurements, Sanitary engineering, Control, *Treatment facilities, *Abstracts.

A collection of abstracts summarizing technical articles related to the instrumentation and automation of waste water treatment plants was developed. This literature search encompassed most recognized environmental instrument and automatic control periodicals, symposium series, and conference proceedings published from 1967 to 1973. In addition, scientific and engineering abstracting publications were researched for pertinent literature. Approximately 600 abstracts collected during this investigation are classified according to the following four categories: Instruments, Control Experiences and Strategies, Costs, and Support Material. These categories are further refined into numerous subcategories. Each entry contains a title, author, bibliographic citation, abstract, and keywords. An author index and source list are also included. (Prague-FIRL)
W74-10038

BASE CIVIL ENGINEER SANITARY LABORATORY,
Air Force Academy, Colorado Springs, Colo.
S. E. Schultz.
Available from the National Technical Information Service as AD772 686, $4.00 in paper copy, $1.45 in microfiche. Final Report, December, 1973. 105 p, 4 fig, 49 tab.

Descriptors: *Waste water treatment, *Laboratory tests, *Treatment facilities, Laboratory equipment, Reviews, Standards, *Colorado.
Identifiers: Reagents, Floor plans, Apparatus, U.S. Air Force Academy.

A number of standard water and waste water testing laboratories are described. These are equipped to support Base Civil Engineering personnel in operating treatment plants. An itemized list of equipment, apparatus, and reagents for each test to be conducted is given. Included are floor plan drawings of the laboratories and an identification of utility services which are required for operation. (Prague-FIRL)
W74-10039

THE PUDSEY PROJECT,
R. P. Harker, G. Hurst, and B. M. Rock.
Civil Engineering, Vol 44, No 4 p 30-31, April, 1974.

Descriptors: *Water quality, *Effluents, *Sewage, *Textiles, Research and development, Water pollution control, Water quality standards, Suspended solids, Turbidity, Filtration, Chlorination, Mills, *Water reuse.
Identifiers: Pudsey Works(England/U.K.), *Wool textile industry, Textile mills, *United Kingdom.

Research and development by the Wool Industry Research Association (WIRA) and the water pollution control department of the Pudsey Borough Council has been carried out to see how sewage effluent might be used for wet processes. It was generally thought that a very high quality of water was required for wool textile industry wet processes. However, the data collected indicate that sewage works effluent agrees with the specifications--iron 0.5 mg/liter, manganese 0.1 mg/liter, total hardness of 50 to 100 mg/liter as CaCO3. They do not agree reasonably with turbidity, color, and suspended solids. However, after suitable filtration and chlorination it seemed that the effluent waters would meet these standards. From laboratory and mill based trials, it was concluded that the wet processes at the mill could be carried out using effluent from Pudsey Works. (Prague-FIRL)
W74-10041

NUTRIENT CONTROL IN SEWAGE LAGOONS,
Pollutech Pollution Advisory Services Ltd., Oakville, (Ontario).
Research Program for the Abatement of Municipal Pollution Within the Provisions of the Canada-Ontario Agreement on Great Lakes Water Quality, Research Report No 8, 56 p, 23 fig, 2 tab, 7 ref.

Descriptors: *Phosphates, *Sewage lagoons, Laboratory tests, Model studies, Computers, Solids, Liquids, Dissolved oxygen, Phosphorus, Effluents, Chemical control, Carbon, *Canada, Hydrogen ion concentration, *Waste water treatment.
Identifiers: Soluble phosphates, Bottom deposits, Chemical dosages, Ontario(Canada).

The effects and behavior of precipitated phosphates in sewage laggons were studied. Two techniques were used to simulate lagoon conditions to obtain data for the possible long-term distribution of phosphates between the solid and liquid phases in treatment lagoons. One method utilized laboratory-scale simulators operated under closely controlled conditions of temperature and loading. In the second method, a computational procedure was developed, involving the use of a computer model written to simulate the removal of soluble phosphates by precipitation with alum. Full-scale lagoons were used for comparative purposes in the first method. Two laboratory units were seeded from bottom deposits, and filled with lagoon effluent taken from the full-scale lagoons. In each case one lagoon was operated as a control, and the other received chemical dosing. In both the full-scale control lagoon and the laboratory control lagoon, during periods of low dissolved oxygen, both phosphorus and carbon were resolubilized from bottom deposits. The phosphorus resolubilization rate was much less dependent on temperature and lagoon maturity than carbon. The laboratory simulators indicated that more extensive phosphorus resolubilization would occur at higher temperatures; pH was not a governing factor for phosphorus resolubilization. (Prague-FIRL)
W74-10043

TO ESTABLISH VIABLE METHODS OF MAINTAINING WASTE TREATMENT FACILITY EFFICIENCIES WITH REFERENCE TO FLOW VARIATIONS,
Maclaren, James F. Ltd., Willowdale (Ontario).
Research Program for the Abatement of Municipal Pollution Within the Provisions of the Canada-Ontario Agreement on Great Lakes Water Quality, Research Report No 11, 1974. 91 p, 34 fig, 13 ref.

Descriptors: *Sewage treatment, *Flow, *Waste water treatment, *Treatment facilities, Design, Hydraulics, Costs, Methodology, Data Efficiency, *Canada.
Identifiers: Flow equalization, Sewage flow, Process operations, Ontario(Canada).

Equalization of sewage flow variations has several major benefits: reduced unit size requirements for

treatment facilities; more stablized process operations; and, reduced bypassing of the incoming flow. Limited attention has been given to these aspects. The first step was to develop a methodology for sizing equalization facilities taking into account diurnal, daily and seasonal variations in sewage flow. Actual flow data from a treatment plant having a 40-50 MIGD (million imperial gallons per day) capacity were used in development of methodology. The significance of flow equalization to the design of treatment facilities was developed by revising design criteria for sizing treatment facilities. These were established using basic design concepts incorporating modified hydraulic characteristics of equalized sewage flow into the design. The methodology was then applied to sizing treatment facilities for a plant of similar size to the selected plant operating under equalized and varying flow conditions. It was found that a saving in capital costs would be realized by installing equalization facilities. In conclusion, the study verified the need for further investigation into the potential benefits of flow equalization. (Prague-FIRL)
W74-10046

REUSE AND RECYCLE OF WATER IN INDUSTRY,
Bostock, Hill and Ribgy Birmingham, (England).
C. J. Appleyard, and A. B. Mukerji.
Chemistry and Industry, No 6, p 240-246, March 16, 1971. 2 tab, 10 ref.

Descriptors: *Water reuse, *Recycling, *Industries, *Treatment facilities, Food processing industry, Textiles, Dissolved solids, Costs, *Waste water treatment, *Industrial water.
Identifiers: Phase separation, Organic material removal, Electronic industry, Television tubes, Steel works.

Water reuse of recycle both reduces the requirement of raw water and reduces the volume of effluent which has to be subsequently disposed of as well as the size of any treatment plant required. In industry, in order to utilize water reuse, a balance must be drawn up followed by a detailed survey to indicate: whether the effluents are suitable for reuse or recycle with or without treatment; whether water is being used unnecessarily; the minimum, average, and maximum quantity of water required; frequency of use; nature and amount of contamination; and nature of treatments required. Industries discussed include the food industry, the electronic industry, the semiconductor industry, the manufacture of television tubes, the textile industries, cooling water reuse, steel works. Problems related specifically to each are described. Treatments included removal of particulate matter or phase separation, removal of dissolved inorganic ions, and removal of soluble organic material. It was concluded that in almost every industry recycle or reuse of water must be accommodated in the future for both economics and conservation. (Prague-FIRL)
W74-10051

EPA'S RUCKELSHAUS: 'FROM CARELESS INDIFFERENCE TO REMEDIAL ACTION',
Environmental Protection Agency, Washington, D.C.
W. D. Ruckelshaus.
Journal of the Water Pollution Control Federation, Vol 44, No 4, p 523-530, April 1972. 1 photo.

Descriptors: *Water pollution, *Treatment facilities, *Waste water treatment, *Water pollution control, *Legislation, Permits, Water pollution sources, Water pollution treatment, Sewage treatment, Sewage sludge, Industrial wastes, Municipal wastes, Environmental sanitation, Detergents, River basin development, Planning, Law enforcement, Government finance, Legal aspects.
Identifiers: Environmental Protection Agency(EPA).

EPA action on water pollution and waste water treatment plants is described. We have taken concrete remedial action to restore our heritage of clean, fresh, free-flowing waterways. The permit programs for industrial discharges, and over 180 enforcement actions against major municipal and industrial polluters are described. A restructuring of the nation's waste treatment capacity is predicted. The habit of building one system at a time must change and regional and river basin planning is essential. The proposal for permitting municipalities planning construction of waste treatment facilities to award turnkey contracts is discussed. Under this system, a single organization would be responsible for all aspects of a construction project. EPA has placed new emphasis on manpower and training. The EPA is drawing together all the elements needed to produce well-trained water pollution control personnel. (Craig-Florida)
W74-10072

COMMUNITY ADOPTION OF WATER REUSE SYSTEMS IN THE UNITED STATES,
Clark Univ., Worcester, Mass.
R. E. Kasperson, D. Baumann, D. Dworkin, D. McCauley, and J. Reynolds.
Available from the National Technical Information Service as PB-234 030, $7.25 in paper copy, $1.45 in microfiche. Office of Water Resources Research Completion Report, 1974. 313 p, 7 fig, 19 tab, append. OWRR C-2178 (3379)(1). Report, 7/1/70-3/31/74.

Descriptors: *Water reuse, Reclaimed water, Social aspects, Cities, Behavior, Attitudes, *Economic feasibility, Decision making, Model studies, *Management, *Adoption of practices, *Municipal water, Community development, Urban sociology.
Identifiers: Renovated waste water, *Public attitudes.

Study objectives were: (a) to identify the major social obstacles to wider community adoption of water reuse systems and to measure the effects of perceptions and attitudes; (b) to determine the origins of these obstacles in diverse community and managerial settings and to consider opportunities designed to encourage the consideration of the use of renovated wastewater; and (c) to delineate the economic parameters of the decision to reuse water and to formulate a model designed to evaluate feasibility. Researchers visited eight cities during 1970 and 1971 where some 625 interviews and 45 lengthier interviews with managers resulted. The studies also created a data inventory of the character of the effluent treatment processes, water needs and supply characteristics, and costs and time sequence information. The results were then submitted to computer analysis. These analyses produced the major study results which include a comparative profile of water reuse in six American cities, an elaborate model which treats reuse adoption by the managerial system as a form of adaptation, an exploration of the economic parameters of water reuse, an evaluation of myth and reality in our understanding of public attitudes toward the use of renovated wastewater, and a detailed examination of the public response to drinking reclaimed water.
W74-10081

REMOVAL OF OIL FROM AQUEOUS WASTES BY FLOTATION,
California Univ., Berkeley. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5G.
W74-10082

COMMERCIAL HIGH-LEVEL WASTE PROJECTIONS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5G.
W74-10113

SAVANNAH RIVER LABORATORY, WASTE MANAGEMENT QUARTERLY REPORT, JANUARY-MARCH 1973.
Du Pont de Nemours (E.I.) and Co., Aiken, S. C. Savannah River Lab.
Available from NTIS, Springfield, Va., as Rept. No. DPST-73-125-1; $4.00/copy, $1.45/microfiche. Report No. DPST-73-125-1, 1973. 38 p, 17 fig, 6 tab, 15 ref.

Descriptors: *Radioactive waste disposal, *Management, *Waste storage, *Leakage, *Corrosion, Corrosion control, Safety, Evaluation, Water pollution, Water pollution sources, Monitoring, Observation wells, Deep wells, Drawdown, Water wells, Recharge wells, Aquifers, Bedrock.
Identifiers: *Retrievable surface storage, *Solidification, *Calcination.

Long-term management of high activity waste is currently planned to comprise solidification and storage in an engineered, near-surface facility above the water table, and located on the plantsite. Evaluation study included solid waste forms, solidification processes, and their applicability to plant waste. Laboratory corrosion studies were begun to determine the causes of leaks attributed to corrosion damage in mild steel tanks used to store high activity wastes from separations processes at the Savannah River Plant. Two water-level recovery tests were made in Well DRB 11 in the Triassic basin after drilling stopped at 3320 feet. A Mossbauer technique was developed and used for qualitative determination of iron-containing mineral phases in the saprolite layer between the overlying Tuscaloosa aquifer and the crystalline bedrock beneath the plantsite. (Houser-ORNL)
W74-10116

RADIOACTIVE SOLID WASTE DISPOSAL INTO THE OCEANS: IMPLICATIONS AND PERSPECTIVES,
Comitato Nazionale per l'Energia Nucleare, Rome (Italy).
For primary bibliographic entry see Field 5E.
W74-10117

OVERVIEW OF HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT STUDIES.
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
Available from NTIS, Springfield, Va., as Rept No BNWL-1758; $4/copy, $1.45/microfiche. Report No BNWL-1758, August 1973. 46 p, 25 fig, 1 tab.

Descriptors: *Radioactive waste disposal, *Nuclear wastes, Technology, *Research and development, *Methodology, Storage, Geology, Salt, Oceans, Ice, Safety, Evaluation.
Identifiers: Waste fixation, *Waste management, Land burial, Hydraulic fracturing, Geologic formations, Transmutation, Seabed disposal, Ice sheet disposal.

Technology related to the management of high-level radioactive waste is being developed at several government laboratories. Two of the major areas being investigated by Battelle at the Pacific Northwest Laboratory (PNL) are: Waste Fixation -- Conversion of the waste to a stable solid form. Advanced Disposal Concepts -- A systematic evaluation of candidate disposal methods. An added safety factor to most means of waste storage (temporary and retrievable) and waste disposal (permanent, and nonretrievable or possibly retrievable) could be provided by waste fixation. Technology is being developed through the pilot plant scale to incorporate the high-level waste into extremely immobile solid forms. Alternative concepts for ultimate disposal of solidified high-level radioactive wastes are being evaluated on a systematic basis. The evaluation includes consideration of technical feasibility, safety, cost,

environmental impact, policy conflicts, public acceptance and research and development needs. Waste disposal concepts under evaluation include geologic, seabed, ice sheet and extraterrestrial disposal as well as transmutation (transforming by irradiating certain waste constituents into elements having more desirable waste management characteristics). (Houser-ORNL)
W74-10124

CONFINEMENT SYSTEM OFFERS NEW SOLUTIONS TO OLD PROBLEMS,
T. Zurowski.
Feedlot Management, Vol 15, No 9, p 44, 48, September, 1973, 2 fig.

Descriptors: *Farm wastes, *Feed lots, *Confinement pens, *Livestock, Farm management, *Waste storage, *Wastewater treatment, Costs.
Identifiers: Concrete holding pond, Barn cleaners, Hot water heating systems, Slatted floors, Pollution.

A workable confinement system has been built in Northfield, Minnesota. The system is composed of a confinement barn, a concrete holding pond, barn cleaners, and a special hot water heating system in the floor of the unit which helps make the entire system functional. The barn is divided into 8 pens. Each pen has a capacity for 75 animals with approximately 20 sq. ft. of space per animal. The floor is partially slatted. A steeply sloped pit is located beneath the slatted area. Barn cleaners are at the bottom of the pit. The cleaners dump the manure into a concrete holding pond. To prevent manure freeze up, hot water heating lines are placed beneath the solid portions of the floor. The system, not including cleaners, feed storage, feeders, and waterers, cost $74,000. The advantages of this system are that it is pollution proof and it is easy to operate. Because it has zero discharge from its pens, this operation will comply when any new pollution control regulations are developed. (Cameron-East Central)
W74-10128

ARIZONA OPERATORS QUESTION FLUME CONCEPT,
P. D. Andre.
Beef, Vol 10, No 6, p 44, February, 1974, 2 fig.

Descriptors: *Waste disposal, *Flumes, *Feed lots, *Cattle, *Farm wastes, Design, Ammonia, Costs, *Arizona, Waste treatment.
Identifiers: *Waste management, Slotted floors, Flushing.

A flume structure was tested in Arizona. The test building was 24 feet wide and 400 feet long with two 12 inch flumes on 12 foot centers. Various textures were used on the floor surface, and the slope of the flumes ranged from 1/2 inch to 1 inch per foot. During the feeding test, 80 head of cattle were placed in each pen. An equal number of comparable cattle were put in an adjacent slotted floor building and given the same amount of space per head. Rations were identical. The following problems arose with use of the flume structure: (1) insufficient cleaning, (2) difficulty of the men in maintaining their balance, (3) the need for daily flushing, (4) the need for the cattle to have shade, (5) lack of ammonia control, and (6) the difficulty of cattle in getting their footing. There was no significant difference in the performance of the groups of cattle and no significant difference in the operating costs of the two operations. (Cartmell-East Central)
W74-10130

NO ODOR AND NO POLLUTION,
Soil Conservation Service, Hondo, Tex.
E. L. Abbott.
Soil Conservation, Vol 39, No 2, p 8-9, September, 1973. 2 fig.

Descriptors: *Odor, *Recycling, *Farm wastes, *Feed lots, Irrigation, Air pollution, Water pollution, *Texas, Bermudagrass, *Waste treatment, Waste disposal.
Identifiers: *Feeding pens, *Slatted floors, Detention pits, Concrete tile lines.

Near Devine, Texas, is a cattle feedlot which has a total recycling system for feedlot wastes. Feeding pens, designed so that all waste material on the floor drains downward, are all concrete with half the area of each pen under roof. Floors are flushed at regular intervals causing waste material to drain into a concrete tile line which carries it into a two-compartment concrete detention pit. There quantities of clear water are added to the slurry. The liquid is lifted by a pump and flows under pressure through an underground pipeline to pivoting irrigation booms which sprinkle the 'brown water' on the soil of mowed fields. A second concrete pit provides an overflow catch basin which assures no escape of waste material. Coastal bermudagrass is the best grass for this type of fertilizer-irrigation. The grass goes through a dehydration process before it is pelleted to be fed to the cattle. This type of feedlot has been designed and tested to be sure the pollution was a thing of the past. This particular feedlot has won many awards for its success. (Cameron-East Central)
W74-10132

FEEDLOT WASTE MANAGEMENT: PROGRESS AND OUTLOOK,
Texas A and M Univ., College Station. Dept. of Agricultural.
J. M. Sweeten.
Texas Agricultural Progress, Vol 19, No 2, p 18-19, Spring, 1973.

Descriptors: *Waste disposal, *Waste treatment, *Feed lots, *Pollution abatement, *Farm wastes, Water pollution control, Odor, Recycling, Irrigation, Fertilization, Rainfall, Solid wastes, Regulation, *Texas.
Identifiers: *Waste mangement, Refeeding, Pyrolysis, Odor intensities, Climatic variables.

Water pollution abatement was an environmental pollution problem for Texas cattle feeders. The Texas Water Quality Board restricts seepage to ground water and forbids discharge of feedlot runoff from rainfall. To prevent this seepage, diversion channels, retention ponds and irrigation systems are constructed near playa lakes. Texas standards for feedlots may serve as a model for forthcoming federal water pollution limitations. Another environmental problem is the large number of manure stockpiles. These wastes are being disposed of by farmers interested in increased profits from crop production. Research of the USDA at Bushland, Texas, shows that 10-ton-per-acre applications of feedlot manure matched nitrogen-phosphorus-potassium fertilization in production of grain sorghum. Test results indicate that feedlot manure can be safely and economically applied at 10 tons per acre per year under many soil and cropping conditions. Besides land disposal, recycling methods involve converting animal wastes into animal feed, fuels, building materials and other products. Solutions to feedlot odor problems need to be developed. Odor intensities, climatic variables, and waste management practices need to be understood before this can be done. When these pollution problems have been solved, feedlot waste management may involve economic alternatives rather than being primarily involved with pollution abatement. (Cameron-East Central)
W74-10133

CLIMATE AND THE SELECTION OF A BEEF HOUSING AND WASTE MANAGEMENT SYSTEM,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
A. F. Butchbaker, G. W. A. Mahoney, and J. E. Garton.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 4, p 734-739, July-Aug, 1973. 5 fig, 1 tab, 27 ref.

Descriptors: *Climate, *Climatic data, *Climatic zones, *Feed lots, Farm wastes, *Waste treatment, Waste disposal, Cattle, Temperature, Moisture.
Identifiers: *Beef housing, Climatological maps.

Location of a beef feedlot is influenced by factors related to economics, local topography, nearness to residential areas, soil type, roads, microclimate, streams or lakes, area for waste disposal, and climatic conditions. This report is concerned with climate, one of the major considerations in determining a feedlot location because climate influences both capital investment and operating cost. Some of the climatic factors affecting waste management systems are those that also affect animal performance. These include temperature, humidity, solar radiation, wind, evaporation, precipitation, sunshine, and storms. These topics are explained. Beef housing climatic zones were developed by using air temperature, evaporation and precipitation. Another method of classifying beef housing and waste management systems is to develop a climatological map utilizing mean annual air temperature and moisture deficit. These climatological maps may be used to select a general waste management system. The waste management systems in the various climatological areas should be considered as those that are optimum for that area. (Cartmell-East Central)
W74-10134

MANAGING DEEP-PIT HOUSE TO REDUCE DRYING COSTS.
Egg Industry, Vol 6, No 7, p 31, 34, July, 1973. 2 tab.

Descriptors: *Farm wastes, *Poultry, *Drying, *Waste storage, *Costs, *Waste treatment, Temperature, Humidity, Ventilation, Sampling moisture content, Maine.
Identifiers: Deep-pit poultry house, Pits, Dropping boards.

Research was done in Maine to try to reduce manure drying costs. The research was based on a study of four poultry farms, three brown-egg type houses, and one white egg. At each of the four farms, trials were run in winter, spring, and late summer. Manure samples were collected after one, two, and three-day accumulations--on both dropping boards and in the pit. Observations revealed that manure dried faster in the pit than on the boards after the first day. Manure dried to a lower moisture content during spring and summer in both pen and pit. The observations also indicated that under conditions normally present in Maine cage laying houses, the greatest amount of manure drying occurred the first day--regardless of location within the house. (Ballard-East Central)
W74-10135

MANURE IN PIT DRIES TO 15% MOISTURE,
Tennessee Univ., Knoxville.
H. C. Goan.
Poultry Digest, Vol 32, No 382, p 506-507, November, 1973. 1 fig.

Descriptors: *Farm wastes, *Moisture content, *Drying, *Poultry, *Waste storage, *Waste treatment, Aeration, Ventilation, Air circulation, Tennessee.
Identifiers: Fans, Deep-pit poultry house, Beetles, Marek's disease.

Manure in a high-rise or deep-pit poultry house in humid Robertson County, Tennessee, dries down to a moisture level of 15%. The 44x500-foot house has a capacity for 50,000 layers and the pit area is approximately seven feet deep. The pit is ventilated by fourteen 48 inch fans located in the side of

the wall of the manure storage area. An additional fourteen 30 inch fans are located in the pit itself. Aiding in the drying process, the burrowing action of beetles of the lesser mealworm leave small holes and tunnels in the manure which are believed to greatly increase the drying process. So far the beetles have caused no problems, but because the beetles may be potential carriers of Marek's disease, chickens should be obtained that have been vaccinated against this disease. (Ballard-East Central)
W74-10137

FEEDLOTS POINT SOURCE CATEGORY: EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10139

CONCENTRATION OF PROTEINACEOUS SOLIDS FROM AERATED SWINE MANURE,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
L. W. J. Holmes.
Ms. Thesis, 1971. 92 p.

Descriptors: *Farm wastes, *Hogs, *Aeration, *Oxidation lagoons, *Recycling, Suspended solids, Sieves, Centrifugation, Amino acids, Proteins.
Identifiers: *Manure, *Refeeding, Proteinaceous solids, Oxidation ditch mixed liquor.

This study was undertaken to determine what fraction of swine oxidation ditch mixed-liquor (ODML) possessed a refeeding potential; and to determine the best method of recovery and concentration of this fraction. Swine ODML samples were passed through a series of sieves, ranging in size from 20-to 200-mesh. The solids retained on each screen were dried, weighed and analyzed for kjeldahl nitrogen. The highest crude protein and largest weight fraction was contained in the smallest size fraction, those suspended solids passing through a 200-mesh sieve. Preliminary investigations indicated that centrifugation was a promising method of ODML S.S. concentration. Centrifuging trials were run on screened ODML to determine the optimum feed rate and G force required to produce a concentrated cake of approximately 6-8 percent solids dry weight basis (dwb). Increasing the feed S.S. concentration had the effect of decreasing S.S. recovery. Centrifuged samples of swine ODML were found to contain a greater percentage of essential amino acids than corn. Centrifugation has been shown to be a feasible method of concentrating the amino acid-rich portion of swine ODML. Liquid volume reduction on the order of 85 percent can be achieved by increasing the solids content of ODML from 1.2 to 8 percent. This solids concentration is sufficient to enable researchers to refeed a substantial amount of swine ODML S.S. without including the bulk of the carrier liquid in the feed. (Cartmell-East Central)
W74-10140

WASTE MANAGEMENT AND ANIMAL PERFORMANCE IN BEEF FEEDLOTS,
Nebraska Univ., Omaha.
W. Woods, T. M. McCalla, C. B. Gilbertson, and J. R. Ellis.
Nebraska Beef Cattle Report, Nebraska Agricultural Experiment Station, EC 72-218, p 26-28, 1972. 2 fig, 2 tab.

Descriptors: *Feed lots, *Cattle, *Control, Farm wastes, Density, Runoff, Consumption, *Nebraska, Waste treatment.
Identifiers: *Waste management, Slope.

A waste management research program was developed with these objectives: (1) to maintain or improve the environment, (2) to permit growth and development of livestock industry, and (3) to recognize that changes in animal agriculture must be economically sound. The research program measured characteristics of runoff from feedlots, percolation into the soil, and animal responses to lot surface conditions, animal density, and lot slope. A comparison was made of 100 and 200 square feet per animal. One lot at each density was on 3, 6, and 9 percent slope. All cattle were fed the same ration to permit direct comparison of animal density and effect of slope of lot upon performance. Having cattle at 100 square feet per head reduced animal performance as compared to 200 square feet per head. At 200 square feet per head, lot surfaces were less than adequate and gains might be reduced. (Cameron-East Central)
W74-10141

EFFECTS OF PARTICLE SIZE ON THE AEROBIC TREATMENT OF ANIMAL WASTE,
Purdue Univ., Lafayette, Ind. Department of Agricultural Engineering.
J. A. Lindley.
MS Thesis, 1970, 122 p, 31 fig, 41 tab, 38 ref.

Descriptors: *Farm wastes, *Aerobic treatment, *Particle size, Chemical oxygen demand, Biochemical oxygen demand, Aeration, Sampling, Analysis, Feeds, Dairy industry, Cattle, *Waste water treatment, Volatility, Digestion.
Identifiers: Refeeding.

Design of efficient treatment processes (such as aerobic biological treatment) requires a thorough knowledge of the waste and effects of variation in this material. Research was conducted to study the effects caused from differences of fractions with particle sizes that could be measured by sieving techniques. The results of analyzing 24 samples of dairy farm wastes gave an average geometric mean particle size of 860.85 microns. The mean range was from 1490 microns to 402 microns. Organic content was found to increase with particle size of 860.85 microns. The mean range was from 1490 microns to 402 microns. Organic content was found to increase with particle size, while chemical oxygen demand and biochemical oxygen demand varies inversely with particle size. The rate of volatile solids decomposition in an aerobic treatment process may decrease with larger waste fineness values, but the effect is slight. (Frantz-East Central)
W74-10142

THE MAINE DEEP PIT CAGE LAYING HOUSE,
Univ., Maine, Orono.
C. W. Kittridge.
Paper No 70-915 presented at the 1970 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 8-11, 1970, 8 p, 3 fig, 1 tab, 1 ref.

Descriptors: *Farm wastes, *Poultry, *Waste storage, *Maine, Costs, Moisture, Dehydration, Drainage, Fertilizers, Confinement pens, Construction.
Identifiers: *Deep pit caged laying houses.

The deep pit caged laying house is a feasible method of poultry waste handling in northern climates. Wastes can be removed on a yearly or two-year basis. The wastes dry to an approximate moisture content of 50% and odors are practically nil during the storage period. Excavation of the deep pit is about 8 feet. Proper drainage must be insured and basement walls and floors must be watertight. Deep pit caged laying houses are economical because of infrequent waste handling. These systems, when properly constructed and managed, have been successful in Maine. (Frantz-East Central)
W74-10144

A ROTATING FLIGHTED CYLINDER TO SEPARATE MANURE SOLIDS FROM WATER,
Dept. of Agricultural Engineering. Oregon State Univ., Corvallis.
W. E. Verley, and J. R. Miner.
Paper No 73-410 presented at 1973 Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973, 9 fig, 3 tab, 6 ref.

Descriptors: *Farm wastes, *Slurries, *Water, *Waste treatment, *Waste disposal, *Sedimentation, *Separation techniques, Kinetics, Suspended solids, Oregon, Pumps, Weirs, Irrigation.
Identifiers: *Hydraulic manure transport systems, Settleable solids, Rotating flighted cylinder, Concentrated solids, Manure.

A rotating included tube, fitted with a helical fin on the inner surface was designed, built and tested to remove solids from liquid manure. Initially, a manure slurry of approximately 0.4 percent settleable solids was run through the device at 0.5 gallons per minute, averaging a settleable solids removal of 30 percent. The design of the device was revised from 8 inches in diameter to a 24 inch diameter tube and was retested. The device offered an increased volumetric capacity, consumed little power, and was immune to plugging problems. The concept is simple and has potential applications wherever it is desired to concentrate solids or claim water for reuse. (Frantz-East Central)
W74-10145

THE PERFORMANCE OF PRIMARY SETTLING ON LIVESTOCK FEEDLOT RUNOFF,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
J. C. Nye, A. L. Sutton, and E. R. Baugh.
Paper No 73-412 presented at 1973 Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973. 7 p, 2 fig, 1 tab, 2 ref.

Descriptors: *Livestock, *Cattle, *Feed lots, *Farm wastes, *Waste treatment, *Agricultural runoff, *Sedimentation, *Settling basins, Weirs, Indiana.
Identifiers: Porous dams, Fly breeding.

Primary sedimentation criteria were used to design a settling basin for runoff from a 200 head solid concrete beef feedlot. Sedimentation through the settling basin, consisting of three parallel chambers separated by porous dams, provided for settling rates of 3, 5.5, and 11 cubic feet per hour sq. feet of surface area for a 2-inch per hour rainfall intensity. Two problems were encountered--clogging of gravel dams, and fly breeding. A surface settling of 4 cu. ft/hr/sq. ft. and a weir loading rate of 100 cu. ft. per hr. per linear ft. were recommended as design criteria for feedlots of less than 300 head of cattle. A settling basin can be used in conjunction with lagoons in order to lower the lagoon loading. Porous dams may be eliminated by using liquid manure handling equipment to clean settling tanks. In some locations it may be possible to use this in conjunction with grass waterways and eliminate the need for lagoons or liquid handling equipment. (Drewry-East Central)
W74-10146

QUALITY DEGRADATION OF DAIRY WASHWATER,
California Univ., Riverside.
For primary bibliographic entry see Field 5B.
W74-10147

SETTLING SOLIDS IN ANIMAL WASTE SLURRIES,
Minnesota Univ., St. Paul. Dept. of Agricultural Engineering.
J. A. Moore, R. O. Hegg, D. C. Scholz, and E. Strauman.

Paper No 73-438 presented at the Annual Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973, 17 p, 5 fig, 1 tab, 14 ref.

Descriptors: *Farm wastes, *Slurries, *Sedimentation, Sampling, Chemical oxygen demand, Livestock, *Waste water treatment, Suspended solids, Design data, Feed lots, Solid wastes, *Minnesota.
Identifiers: *Settling solids, Total solids, Volatile solids.

Research was conducted to develop design curves which may be used in applying sedimentation principles to the treatment of animal wastes. Samples of slurries were measured for solids at the tops of cylinders at 0, 1, 10, 100 and 1000 minutes. The chemical oxygen demand, total solids (TS), and total volatile solids (TVS) were determined for waste samples from poultry, beef and dairy cattle, horses, and swine. It was concluded that settling can efficiently remove TS and COD. The shapes of the design curves were almost identical regardless of the percent TS slurry within the range of 1 to .01%. TS values were generally higher than COD values. For closed recycling systems, one to ten minutes of detention time might be used for design purposes. (Frantz-East Central)
W74-10148

SYMPOSIUM: PROCESSING AGRICULTURAL AND MUNICIPAL WASTES.
Symposium held in New York, New York, August 27-28, 1972, 221 p, (1972) G. E. Inglett, editor. 90 fig, 66 tab, 301 ref.

Descriptors: *Research and development, *Waste treatment, *Recycling, *Waste disposal, *Farm wastes, Municipal wastes, Industrial wastes, Water pollution, Air pollution, Soil contamination, Environmental control.

To meet the needs of the increasing world population, cities became larger, industries expand, and agricultural operations become larger and more automated. All of these necessary increases in production result in a simultaneous increase in waste production and the problem of adequately dealing with this waste broadens. The papers of this symposium indicate that this problem is being met head-on, and technology is being devised, tested, and re-examined to deal with the waste problem. Advances in recycling animal, poultry, and industrial wastes have been recorded, but much more has been shown to be necessary. Various methods for utilization of these by-products have been outlined and offer very promising results. (See W74-10150 thru W74-10159) (Russell-East Central)
W74-10149

THE CHALLENGE OF WASTE UTILIZATION,
G. E. Inglett.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 1-5, (1972) 3 tab, 8 ref.

Descriptors: *Farm wastes, *Municipal wastes, *Livestock, *Waste treatment, *Waste disposal, Agricultural wastes, Industrial wastes, Technology, IEnvironmental control.
Identifiers: *Waste management, Processing, *Waste utilization, Meat consumption, Composting.

Large concentrations of people, animals, and manufactured goods create waste problems. In 1965, 575 billion pounds of solid waste were produced for disposal. Of this total, industrial waste accounted for 229 billion pounds. This leaves 60% of the total waste production to come from agricultural waste. Concentration of animal waste is highly dependent on the present trends of automation and centralization. In cattle, swine, dairy herds, and poultry, feedlots are becoming larger and fewer thus causing greater waste problems. Increasing consumption of meat with concomitant population growth can predictably bring more agricultural waste. For each pound of beef produced, 25 pounds of manure are produced. Thus, by 1980, 470 million tons of cattle manure will be produced for the estimated 235 million beef consumers in the United States. There is an immediate need for more technology for developing systems for waste management and utilization. Some of the proposed processes and related technology in this symposium may fill this need. (See also W74-10149) (Russell-East Central)
W74-10150

ECONOMIC ISSUES IN MANAGEMENT AND UTILIZATION OF WASTE,
A. C. Manchester, and J. G. Vertrees.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 6-12, (1972) 6 ref.

Descriptors: *Economics, *Waste treatment, *Recycling, Equity, Poultry, Livestock.
Identifiers: *Waste management, *Waste utilization, Public policy, Government cost-sharing.

There is no universal solution to waste management problems. Alternative waste management methods exist for most firms, creating a need for economic analysis to determine the least-cost solution. The economic choice is between waste treatment and waste utilization. Utilization offers more long term promise, but before launching large projects an analysis of waste utilization should be undertaken. In determining economic feasibility of utilization three factors should be considered: (1) the market potential of waste utilization products; (2) the cost of such a process; and (3) the cost of waste management alternatives. The potential for increased utilization of waste is dependent on public policy toward utilization and on equity. Government cost-sharing may stimulate industries into using wastes, and even without significant aid or price change, many firms will utilize waste from their operations as a least-cost means of waste management when the costs of alternatives are evaluated. (See also W74-10149) (Russell-East-Central)
W74-10151

PROCESSING ANIMAL WASTES FOR FEED AND INDUSTRIAL PRODUCTS,
J. H. Sloneker, R. V. Jones, H. L. Griffin, K. Eskins, and B. L. Bucher.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 13-28, (1972) 1 fig, 8 tab, 20 ref.

Descriptors: *Farm wastes, *Recycling, *Feeds, *Waste treatment, *Waste disposal, Nitrogen, Amino acids, Fermentation, Organic matter, Enzymes, Proteins.
Identifiers: Processing, Feed products, *Industrial products, Feedlot waste fractionation, Hardboard.

Reprocessing animal waste offers promising possibilities for elimination of a huge waste management problem. The average feeder steer generates 2.2 pounds of protein per day. If processed a feed of manure has a value comparable to soybean meal and is worth about $20 per ton more than the cost of recovery. By a simple screening process, approximately 70% of the total nitrogen can be recovered from feedlot waste as a potential feed fraction containing 35-40% protein and representing approximately 40% of the total waste solids. The remaining bulky fiber fraction can be converted into a cheap, nonodorous ingredient for fiberboard-like products. Alternatively, the fiber fraction and solubles can be recombined and used as a fermentation substrate for the cellulolytic fungus, T. viride. Studies with whole manure and the fibrous fraction indicate that more than 25% of the organic matter is digested by the fungus with complete retention of the nitrogen. These data illustrate that, potentially, T. viride enzymes as an additive can increase the digestibility and metabolizable energy of feeds. (See also W74-10149) (Russell-East Central)
W74-10152

PROCESSING ANIMAL WASTE BY ANAEROBIC FERMENTATION,
W. B. Coe, and M. Turk.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 29-37, (1972) 1 fig, 1 tab.

Descriptors: *Recycling, *Farm wastes, *Fermentation, *Anaerobic conditions, Aerobic conditions, *Wastewater treatment, Feed lots, Chemical analysis, Economics, Ammonia, Cattle.
Identifiers: Processing, Refeeding.

Wastes must be recycled into products which can be used by the producer of these wastes. The recycling must be conducted in a non-polluting and profitable manner. The most desirable recycling product is a feed ingredient. The two major systems for degradation of manure utilize microbial conversion and consist of aerobic processes. Recent efforts have been directed toward aerobic techniques, but these processes have proved to be costly. The anaerobic process is technically and economically the most attractive method of recycling animal wastes. This process produces two products (a feed ingredient and a fuel in the form of methane) useful to the animal feeder. It accepts all the wastes produced without pollutional discharges and is potentially profitable. The anaerobic process requires two-thirds the capital investment and one-half the annual operating expense of the aerobic process. (See also W74-10149) (Russell-East Central)
W74-10153

AGRICULTURAL CELLULOSIC WASTES FOR FEED,
T. Klopfenstein, and W. Kaers.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, Aug. 27-18, 1972, p 38-54, (1972) 13 tab, 33 ref.

Descriptors: *Farm wastes, *Feeds, *Cellulose, *Waste treatment, Performance, Livestock, Silage, Inhibitors, Alkalinity.
Identifiers: Sodium hydroxide, Digestibility, Roughage.

Agricultural cellulosic wastes such as crop residues, fecal matter, paper, wood by-products and similar materials represent a vast supply of poorly utilized energy. Ruminants possess a unique digestive system which enables them to partially utilize the carbohydrate fraction of these materials. There are two procedures for enhancement of cellulosic waste usage. The first is the addition of sodium hydroxide to low-quality roughage followed by ensiling. At the present time, this appears to have practical applications, although the mechanics of collecting these low quality roughages and addition of sodium hydroxide and water would appear to be the greatest problems. The second procedure utilizes high pressure and temperature treatment of forages. To be practical and economical, this procedure would require an operation where materials could be collected and treated at a large centrally located facility. However, with treatment of large quantities the cost could probably be held within a practical range. (See also W74-10149) (Russell-East Central)
W74-10154

NUTRITIVE EVALUATIONS OF ANIMAL MANURES,
L. W. Smith.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 17-28, 1972, p 55-74, (1972) 92 ref, 8 tab, 1 fig.

Descriptors: *Nutrients, *Farm wastes, *Recycling, *Feeds, Chemical properties, Nitrogen, Ruminants, Fermentation, *Cellulose.
Identifiers: *Waste utilization, Processing methods, Digestibility, Wastelage.

Three major factors influence chemical compositions of animal manures: (1) the species of animal; (2) the compositions of diets fed; and (3) nutrition. Feeding trials illustrate that poultry manure is high in nitrogen and is more advantageously utilized by ruminants than by other animals. Ruminants also have a lower digestibility of cell walls than do monogastric species. Thus, monogastric feces are shown to be superior in nutritive value to ruminant feces, as indicated by the higher nitrogen and low cell wall content. However, before manure can be utilized as a nutritive feed, economical processing methods must be developed. Several methods have been reported for using biological intermediates for recovery of protein from manure. Also rapid advances in physical, chemical, and fermentation technology will provide better methods for conversion of manures into products of high nutritive value for animal feeding. (See also W74-10149) (Russell-East Central)
W74-10155

AUTOMATED RECYCLE SYSTEM FOR LIVESTOCK WASTE TREATMENT,
E. P. Taiganides, and R. K. White.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 75-83, (1972) 10 fig.

Descriptors: *Recycling, *Farm wastes, *Waste treatment, *Livestock, *Automation, Oxidation lagoons, Effluent, Foaming, Influent, Biochemical oxygen demand.
Identifiers: Water flushing, Sludge index.

In today's large confined swine facilities, the waste handling and treatment system is often the factor controlling the success of the operation. Certain criteria must be considered in order to evaluate the livestock waste system; namely, ecology, economics, esthetics, and technology. A five hundred pig swine unit was tested by treatment and recycling of the effluent. Automated flushing from the swine building worked extremely well. There was little odor in the confinement building and no odor in the waste facility. Foaming of the oxidation ditch was a problem but a foam-suppressing drum has been the most suitable method for controlling the foam. Over a ninety percent reduction in the biochemical oxygen demand of the influent to the oxidation ditch, as compared to the effluent for recycling, has been achieved. The use of a Sludge Index has been found to be a good parameter for monitoring the operation of the oxidation ditch. (See also W74-10149) (Russell-East Central)
W74-10156

FUEL FROM AGRICULTURAL WASTES,
H. R. Appell, and R. D. Miller.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 84-92, (1972) 5 ref, 5 tab.

Descriptors: *Farm wastes, *Fuels, *Oil, *Waste treatment, Organic matter, Biodegradation, Waste water reclamation, Cellulose, Catalysts, Carbohydrates.
Identifiers: Ash content, Carbon monoxide, Raw materials.

Recognition of the increasing severity of a variety of wastes having a high carbohydrate content, largely cellulose, to the solid wastes problem has resulted in an increased research effort to find uses for waste materials. The conversion of a heavy oil has been one proposed method. A mechanism for the conversion of carbohydrates to oil consists of the following steps: (1) reaction of sodium carbonate and water with carbon monoxide to yield sodium format; (2) dehydration of vicinal hydroxy groups in a carbohydrate to an enol, followed by isomerization to a ketone; (3) reduction of the newly formed carboxyl group to the corresponding alcohol with formate ion and water; and (4) the hydroxyl ion then reacts with additional carbon monoxide to regenerate the formate ion. Although manures are in some respects a desirable feedstock for conversion to oil, the high nitrogen content, the high ash content, and the malodorus aqueous effluent pose problems for further research. (See also W74-10149) (Russell-East Central)
W74-10157

ENERGY FROM THE PYROLYSIS OF AGRICULTURAL WASTES,
M. D. Schlesinger, W. S. Sanner, and D. E. Wolfson.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 93-100, (1972) 4 ref, 3 tab, 1 fig.

Descriptors: *Farm wastes, *Waste treatment, *Waste disposal, Volatility, Cattle, Energy.
Identifiers: *Pyrolysis, Wood waste, Crop wastes, High moisture feedstock.

Experiments were conducted on various agricultural wastes which involved pyrolysis, or the heating of a material to a high temperature in the absence of air. Materials that cannot be burned cleanly in incinerators can be converted to gases, oils, or solids that can be burned cleanly by known methods. Generally, wastes are not available on a year-round basis except in a limited number of circumstances. Crops are harvested at particular times of the year, and feedlots may vary in their population. Because of this irregularity, it seems important to convert wastes of different composition and quantity into a form that may approach compatibility with industrial firing practices. Pyrolysis provides this conversion and is selfsufficient in energy requirements. Practically all the energy in the feeds is recovered in the products. (See also W74-10149) (Russell-East Central)
W74-10158

COMPOSTING AGRICULTURAL AND INDUSTRIAL ORGANIC WASTES,
S. J. Toth.
In: Symposium: Processing Agricultural and Municipal Wastes, New York, New York, August 27-28, 1972, p 172-182, (1972) 8 ref, 4 tab.

Descriptors: *Farm wastes, *Industrial wastes, Moisture content, Aeration, Nitrogen, Phosphorus, Potassium, Livestock, Poultry, Sewage sludge, Municipal wastes, Chemical properties, Physical properties, *Waste treatment, *Organic wastes.
Identifiers: *Composting, Organic residues, Cellophane wastes.

Composts, like plant residues and organic wastes, tend to produce changes in the physical and chemical properties of soils in which they are incorporated. One of the changes in physical properties is an increase in soil aggregation. Addition of composts to soils also adds to the nitrogen, phosphorus, and potash contents of the soils. Many factors such as moisture content, aeration, nitrogen, phosphorus, and potassium, affect composting rates. When composting is finished, the ideal compost has a dark brown color, 80% organic matter, a moisture level of 10-20%, a water holding capacity of 150-200%, an ash content of 10-20%, a nitrogen content of 2.5-3.5%, a phosphorus oxide and potassium oxide content of 1-1.5%, a pH of 5.5-6.5%, and a slightly musty odor. Composts not only consist of animal wastes, but also industrial wastes which are high in carbon or organic matter. Municipal garbage has been studied as a composting material, but these products have little agricultural value when spread on land. (See also W74-10149) (Russell-East Central)
W74-10159

INTERNATIONAL SYMPOSIUM ON WASTEWATER TREATMENT IN COLD CLIMATES.
Environmental Protection Service, Ottawa (Ontario).
In: Symposium held at University of Saskatchewan Saskatoon, August 22-24, 1973. Environment Canada, Economic and Technical Review Report EPS 3-WP-74-3, Water Pollution Control Directorate, Ottowa, Canada, 1974. 595 p.

Descriptors: *Waste water treatment, *Cold regions, *Waste disposal, *Water supply, Sewage treatment, Temperature, Sewage lagoons, Disinfection, Aeration, Oxidation, Biological treatment, Chemical treatment, Efficiencies, Costs, Planning, Denitrification, Water quality, Water conservation, Anaerobic digestion, Canada, United States, Phosphorous, Chlorine, S.S.R.

A collection of 28 articles was collated relating to the problems and possible solutions of water supply and waste water treatment in cold environments. Contributions were predominantly from Canada and the United States but 5 other countries were represented. Reports include engineering and research articles, planning discussions, and some quantitative analyses. (See also W74-10161 thru W74-10187) (Shaffer-FIRL)
W74-10160

AN EVALUATION OF WASTE DISPOSAL PRACTICES IN ALASKA VILLAGES,
Alaska State Dept. of Environmental Conservation, Fairbanks.
A. J. Alter.
In: International Symposium on Wasterwater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 1-28, 1974. 12 tab.

Descriptors: *Water supply, *Waste disposal, *Cold regions, *Waste water treatment, Environmenatl control, Biological properties, Chemical properties, Physical properties, *Alaska.
Identifiers: *Cold climates, Environmental management.

Special problems associated with the provision of an adequate water supply and waste disposal in cold climates are discussed. Recommendations are made as to appropriate planning procedures for communities, research needs in the biological, chemical, and physical performance of existing waste treatment methods and of non-frost susceptible methods of environmental management, and the development of realistic, reasonable and equitable methods of finance for supply and treatment systems. (See also W74-10160) (Shaffer-FIRL)
W74-10161

SEWAGE TREATMENT METHODS IN FINLAND,
National Water Board of Finland, Helsinki. Research Inst.
M. Viitasaari.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 29-44, 1974. 10 fig, 2 tab, 4 ref.

Descriptors: *Sewage treatment, *Chemical precipitation, *Biochemical oxygen demand, *Temperature, Oxidation lagoons, Infiltration, Cold regions, *Waste water treatment, Coagulation, Filtration.
Identifiers: Simultaneous precipitation, Direct precipitation, Final coagulation, Mireinfiltration, *Finland.

The Finnish Water Conservation Policy is reviewed. The goals and achievements of using different treatment methods (e.g. simultaneous precipitation, direct precipitation, final coagulation, stabilization ponds, mireinfiltration) are discussed and compared. Four examples of vari-

ous treatment plants' reduction of BOD in percent vs. monthly average temperatures are given. Long term BOD studies were done to compare the effects of treated and untreated effluent. It was shown that untreated effluent exerts a two stage BOD on receiving waters, the second stage coming after approximately 30 days. Treated effluent was found to have a low and constant BOD value. (See also W74-10160) (Shaffer-FIRL)
W74-10162

SWEDISH EXPERIENCES IN SEWAGE TREATMENT,
National Swedish Environmental Protection Board, Solna.
L. Ulmgren.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 45-64, 1974. 6 fig, 6 tab.

Descriptors: *Waste water treatment, *Sewage treatment, *Temperature, *Lime, Biological treatment, Chemical treatment, Chemical precipitation, Cold regions.
Identifiers: *Sweden, *Alum, *Iron salts.

Various methods of sewage treatment are compared including: chemical vs biological treatment; precipitation with lime (slaked or un-slaked) as compared with alum (aluminum sulphate) or iron salts; and various types of sludge treatment. Design guidelines are provided. Any plant located in an area with more than 30 days where the temperature is below minus 10C should be covered. In the colder areas chemical treatment is superior to biological treatment. (See also W74-10160) (Shaffer-FIRL)
W74-10163

SEWAGE TREATMENT IN THE NORTHERN AREAS OF THE U.S.S.R.,
L. A. Alferova, I. V. Skirdov, V. G. Ponomarev, B. M. Hudenko, and B. A. Gladkov.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 64-74, 1974. 3 tab.

Descriptors: *Waste water treatment, *Sewage treatment, *Treatment facilities, *Temperature, *Biological treatment, Oxidation, Nitrification, Bacteria, Cold regions.
Identifiers: *USSR, Qu unit, Apt units, Oxitank, Specific oxidation.

Various types of treatment units are discussed with special reference to compact units for small settlement areas. Temperature effects on biochemical processes are reviewed. As the temperature was reduced the biochemical purification of activated sludge was reduced and the specific oxidation rate of organic substances was decreased. The number of bacterial types also decreases with a drop in temperature. Numbers and activity of bacteria associated with the second phase of nitrification showed a reduction at temperatures above 37C or below 15C, especially below 10C. (See also W74-10160) (Shaffer-FIRL)
W74-10164

PROBLEMS OF THE CANADIAN NORTH,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
F. G. Hurtubise.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 75-84, 1974.

Descriptors: *Waste water treatment, *Sewage treatment, *Canada, Planning, Swamps, Lakes, *Lagoons, *Temperature, *Sewage disposal, Incineration, Fertilization, Cold regions.
Identifiers: *Bio disc, Plasticized bags, Vacuum toilet, Recirculating toilet.

The role of the Canadian Environmental Protection Service is examined. Projects in the Northwest Territories are outlined. These include: a study on the use of swampland lakes for sewage treatment; the use of vacuum and recirculating toilet units for sewage collection with subsequent incineration disposal; feasibility of land disposal of sewage effluent or use as fertilizer in permafrost areas; the practicability of the use of physical-chemical and rotating bio-disc treatment plants; the use of lagoon systems to serve isolated institutions; and the use of plasticized paperbags to replace garbage cans. (See also W74-10160) (Shaffer-FIRL)
W74-10165

EXTENDED AERATION, CLARIFICATION AND ANAEROBIC TREATMENT CYCLE,
C. D. Hughes.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 85-98, 1974. 3 fig, 3 tab.

Descriptors: *Aeration, Temperature, *Anaerobic digestion, *Anaerobic conditions, Treatment facilities, Sewage treatment, Biochemical oxygen demand, Cold regions, Design criteria, Costs, *Waste water treatment, *Canada.
Identifiers: Extended aeration, *Clarification, *Brandon(Man.-Candad).

The City of Brandon, Manitoba required a sewage treatment facility to handle 4 to 5 million gallons of industrial and domestic sewage per day during a 4 month winter period. Test results indicate that a mixed system with clarification and sludge return is very effective and not drastically affected by temperature, oxygen variation, or sludge quantity. Twenty hours extended aeration, followed by anaerobic treatment in cold temperatures, can give an economical method of treating sewage and give BOD reduction of 92 percent or better. Some criteria are included. (See also W74-10160) (Shaffer-FIRL)
W74-10166

FURTHER FIELD INVESTIGATION ON AERATED LAGOONS IN THE CITY OF WINNIPEG,
Winnipeg Waterworks, Waste, and Disposal Div. (Manitoba).
R. M. Girling, A. R. Pick, and D. W. Van Es.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 99-124, 1974. 12 fig, 7 tab, 5 ref.

Descriptors: *Waste water treatment, *Canada, *Aerated lagoons, *Aerobic conditions, *Anaerobic conditions, *Nitrification, Temperature, Cold regions, Sludge digestion, Biochemical oxygen demand, Carbon, Aeration, Suspended solids, Performance.
Identifiers: *Total organic carbon, *Winnipeg(Man.-Canada).

The City of Winnipeg made modifications to several of its aerobic-anaerobic lagoons to operate them in series and to test the effectiveness of this method. Included was a test of reduction in total solids during a no feed period. Results were: good BOD reduction (82 percent for system, 50 percent for first lagoon); suspended solids decline through the system; dissolved oxygen was generally above 1 mg/liter in all system parts; temperature decreased through the cell sequence; total organic carbon decreased through the cell sequence; observed significant nitrification well below 10C; the four month no feed period (aeration) had a negligible effect on reducing sludge accumulation; effluent was determined to be satisfactory. (See also W74-10160) (Shaffer-FIRL)
W74-10167

THE EFFECTS OF WATER TEMPERATURE AND ELEVATION UPON AERATION,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
J. S. Hunter, and J. C. Ward.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 125-169, 1974. 8 fig, 2 tab, 24 ref. OWRR A-006-COLO(5), 14-31-0001-3206.

Descriptors: *Waste water treatment, *Water temperature, *Aeration, *Elevation, Cold regions, Mass transfer, *Colorado, Efficiencies, Equations.

A laboratory scale mechanical aeration system simulating near perfect mixing conditions was used to study variation in oxygen transfer rates into water as a function of changes in water temperature (0-40C) variation in overall volumetric mass transfer coefficient for aeration systems which varies linrly with temperature and can be predicted from equation provided. This equation in conjunction with others is usable to construct diagrams of combined effects that elevation and water temperature have on aeration. These diagrams show that factors related to increasing altitude which reduce aerator output predominate over these factors tending to exhaust aerator output. (See also W74-10160) (Shaffer-FIRL)
W74-10168

DIFFUSION SYSTEM FOR COLD CLIMATE LAGOONS,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
C. D. Christianson, and D. W. Smith.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 170-206, 1974. 13 fig, 1 tab, 34 ref.

Descriptors: *Diffusion, *Cold regions, *Aerated lagoons, *Alaska, Dissolved oxygen, Efficiencies, Costs, Maintenance, Ice fog, *Waste water treatment.
Identifiers: Fine bubble diffuser, Coarse bubble diffuser, *Fort Greely(Alas).

Studies to compare coarse and fine bubble aerators were carried out at the Fort Greely lagoon. Dissolved oxygen levels were monitored in both water and sludge. Horsepower requirements of different systems were calculated. Conclusions reached were the fine bubble diffusers are more efficient in oxygen transfer than coarse bubble diffusers, but not necessarily more economical; power requirements in lb 02 per horsepower-hour may be higher for fine bubble diffusers; maintenance requirements are higher for fine bubble diffusers. Oxygenation efficiencies published in the literature may be used for aerated lagoon design but where ice fog is a problem, one must use a larger number of diffusers at increased spacing. (See also W74-10160) (Shaffer-FIRL)
W74-10169

WASTE TREATMENT PERFORMANCE DATA AT PRINCE ALBERT PULP COMPANY,
Prince Albert Pulp Co. Ltd., (Saskatchewan).
O. K. Aschun.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 207-219. 8 fig, 3 ref.

Descriptors: *Pulp and paper industry, *Pulp wastes, Waste water treatment, Biochemical oxygen demand, Cold regions, Toxicity, Performance, *Canada.
Identifiers: *Prince Albert(Sask.-Can.).

Steady state waste treatment data gathered over an 18 month period is presented. These data illustrate the effects of long term trends in production

changes and seasonal effects. There was a marked decrease in BOD during the warm summer months attributed to higher water temperatures. Toxicity tests and results are given. (See also W74-10160) (Shaffer-FIRL)
W74-10170

SURFACE AERATION OF DOMESTIC WASTES SECTION 1 - THE BONNTBROOK SEWAGE TREATMENT PLANT,
Calgary Bonnybrook Treatment Plant (Alberta).
E. I. Meckelborg.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p220-229, 1974. 4 fig, 1 tab.

Descriptors: *Water temperature, *Ice fog, *Aeration, *Canada, Waste water treatment, Biochemical oxygen demand, Efficiencies, Cold regions, Performance.
Identifiers: Clarifiers, Calgary(Alb.-Canada).

The article is a description of the Bonnybrook plant and some problems in the secondary treatment facilities during winter months. Aerator icing emerged as the number one problem. Frozen scum on final clarifiers appears to be infrequent. A minor problem is dense fog over aeration tanks. Analysis of the performance data indicate that during winter months (final effluent temperature below 52F) there was an increase in BOD removal efficiency with an increase in final effluent temperature. (See also W74-10160) (Shaffer-FIRL)
W74-10171

SURFACE AERATION OF DOMESTIC WASTES OPERATING EXPERIENCES AT RED DEER, ALBERTA, SECTION II,
Reid Crowther and Partners Ltd., Calgary (Alberta).
P. D. Lawson.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 230-239, 1974. 6 fig.

Descriptors: *Waste water treatment, *Aeration, Water temperature, *Ice, Cold regions, *Aerated lagoons, *Canada, Efficiencies, Performance.
Identifiers: *Red Deer(Alb.-Canada).

A description of lagoon treatment facilities at Red Deer is given, along with conclusions concerning temperature effects. There is a rapid initial drop in temperature in aerated lagoons when there is a large thermocline from air to water. Ice cover reduces temperature loss. Equilibrium (thermal) is quickly reached. (See also W74-10160) (Shaffer-FIRL)
W74-10172

ON THE COMBINED TREATMENT OF DOMESTIC SEWAGE AND WASTE WATER FROM WOOD INDUSTRIES,
Oulu Univ. (Finland).
J. U. Airaksiner.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 241-257, 1974. 4 fig, 3 tab, 15 ref.

Descriptors: *Pulp and paper industries, *Pulp wastes, Domestic wastes, *Waste water treatment, Water temperature, Performance, Efficiencies, Activated sludge, Cold regions, Aeration.
Identifiers: *Finland, Extended aeration, Waste ponding, Wood industries, Combined treatment.

A review of wood industries' contribution to the waste load of Finnish waters is presented. Eight-eight percent of Finland's BOD is a result of wood industry processes. Combined treatment of domestic and wood industry effluent is discussed as to its advantages and disadvantages. Results of three pilot plant investigations are presented. The three treatment methods are: activated sludge process, extended aeration method, and waste ponding. Results show good standards can be achieved by combined treatment of domestic and wood industry effluent. Temperature has a strong effect on efficiencies, especially in waste ponding where the volume of the ponds must be increased to achieve the desired results. (See also W74-10160) (Shaffer-FIRL)
W74-10173

VACUUM SEWER SYSTEMS FOR NORTHERN APPLICATIONS,
Project Planning Associates Ltd., Toronto (Ontario).
D. W. Averill, and G. W. Heinke.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 258-286, 1974. 5 fig, 21 ref.

Descriptors: Waste water treatment, *Sewerage, Soil properties, Topography, Maintenance costs, *Operating costs, Capital costs, Cold regions, Canada, Alaska.
Identifiers: Bahamas, *Vacuum sewer system, Vacuum transport theory, *Waste water collection.

Where water is scarce, construction materials expensive, and topography and soil conditions incompatable with required grade lines for conventional sewer systems, the vacuum sewer system can be a practical alternative for waste water collection. Use of this type of system to date in the Bahamas, Canada, and plans for use in Alaska are reviewed. Also included is a section on vacuum transport theory as well as operations, maintenance, and capital costs. Advantages cited for this type of system include: horizontal and upgrade transport, flexibility, water savings. Vacuum toilets use about one quart of water per flush as compared with conventional toilets using 2 to 4 gallons per flush. (See also W74-10160) (Shaffer-FIRL)
W74-10174

VACUUM SEWAGE TRANSPORT AND TREATMENT IN RURAL AREAS IN DENMARK,
Electrolux A/S (Denmark).
F. Jespersen.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 287-304, 1974. 6 fig, 11 ref.

Descriptors: *Waste water treatment, *Sewage treatment, *Waste disposal, *Water conservation, Bacteria, Water demand, Cold regions, Water reuse, Water quality, Rural areas.
Identifiers: *Denmark, *Black water, *Grey water, *Vacuum sewage, Waste water collection.

The advantages and potential applications of vacuum sewer systems in Denmark are reviewed. Two of the major arguments presented are: by use of the vacuum system household water demand could be reduced by as much as 50 percent and since black water (e.g. water plus human wastes) is the major source of pathogenic bacteria and nutrient salts, if one separates its handling from grey water, great economies in collection and treatment costs could be realized and improved water quality. If collected separately sewage waste volume could be reduced to 5 percent the present level. Incineration or chemical treatment could be used to dispose of this black water concentrate. (See also W74-10160) (Shaffer-FIRL)
W74-10175

PSYCHROPHILES IN WASTE TREATMENT,
Toronto Univ. (Ontario). Dept. of Civil Engineering.
J. G. Henry.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 305-331, 1974. 3 fig, 4 tab, 32 ref.

Descriptors: *Waste water treatment, *Bacteria, *Temperature, *Metabolism, Treatment facilities, Models, Canada, Cold regions, Pseudomanas, Actinomycetes, Activated sludge, Waste treatment.
Identifiers: *Psychrophiles, *Mesophiles, Flavobacterium, Vibrio, Achromobacter.

The relationship between low temperature, psychrophilic bacteria and their metabolic activity is compared to mesophiles. The study was divided into four areas: full scale treatment plants, pure culture batch tests, continuous mixed culture model studies, and identification of bacteria from model systems. One outcome of study was the lack of a distinct line separating psychrophiles from mesophiles. It was also found that psychrophiles are present in substantial numbers in activated sludge plants, at normal operating temperatures (7C to 27C). Also, the relation between microbial activity and temperature is non-linear. A decrease in activity accelerates at the lower temperatures. Psychrophilic species include Pseudomanas, Flavobacterium, Achromobacter, and Vibrio. (See also W74-10160) (Shaffer-FIRL)
W74-10176

BIO-PROCESSES OF THE OXIDATION DITCH IN A SUB-ARCTIC CLIMATE,
Dames and Moore, Fairbanks, Alaska.
R. S. Murphy, and K. R. Rananthau.
In: International Symposium On Wastewater Treatment In Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 332-357, 1974. 7 fig, 6 tab, 12 ref.

Descriptors: *Biodegradation, Temperature, Cold regions, *Waste water treatment, *Alaska, Activated sludge, *Aeration, Costs, Biological oxygen demand, Suspended solids, Design criteria, Treatment facilities, *Oxidation lagoons.
Identifiers: *Extended aeration.

Waste treatment in Arctic areas shares the same problems as treatment needs world wide, that is: climate, economics, and low population. The extended aeration modification of the activated sludge process appears to be a highly suitable alternative for the treatment of small volumes of waste. This paper examines one form of the extended aeration process, the oxidation ditch. One such facility at College, Alaska was studied during 1967-1968 and showed a 90 percent BOD and suspended solids reduction at 50 percent loading. It was also found that biological processes operated at essentially the same rate at low temperatures as at higher temperatures in more moderate climates. Some design criteria are also included. (See also W74-10160) (Shaffer-FIRL)
W74-10177

LOW TEMPERATURE EXTENDED AERATION THROUGH THE USE OF A FLOATING TUBE SETTLER AND WOOD STAVE TANKAGE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
T. D. Buzzell, C. R. Sherwood, and P. F. Wilbur.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 358-379, 1974. 8 fig, 1 tab, 12 ref.

Descriptors: *Cold regions, *Aeration, *Temperature, *Design criteria, *Treatment facilities, *New Hampshire, *Waste water treatment, Biochemical oxygen demand, Suspended solids, Performance, Clarification.
Identifiers: Floating tube settler, Air diffuser, Low head air blower.

A single tank extended aeration system is described which provides satisfactory secondary

treatment performance, reduces logistics problems, lowers costs, and does not require encapsulation. The system consists of a 2000 gallon redwood stave tank, dual low head air blowers, dual cycle time clocks, necessary air flow piping, a Marlof Rollmix Air Diffuser Assembly, and a floating tube settler. The most significant development is that of the floating tube settler which provides automatic adjustment to peak flow demands, and significantly reduces retention time as compared to typical clarifier units. Design criteria are included. (See also W74-10160) (Shaffer-FIRL)
W74-10178

LOW TEMPERATURE DENITRIFICATION OF WASTEWATER,
McMaster Univ. (Ontario).
R. M. Sutton, K. L. Murphy, and R. N. Dawson.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, 1974. p 380-403, 9 fig, 4 tab, 29 ref.

Descriptors: *Denitrification, *Temperature, *Cold regions, *Waste water treatment, Treatment facilities, *Canada, Performance, Efficiences, Nitrates, Nitrites.
Identifiers: *Stirring tanks, *Packed columns.

The rate of denitrification was determined under various conditions of loading and temperature to ascertain the practicability of the biological denitrification process. The experimental design employed five temperature levels, and two levels of sludge in a stirred tank reactor, as well as five detention time intervals in packed columns. Results showed the stirred tank method providing water with a concentration of less than 1 mg/liter nitrate plus nitrite N2 at temperature 10C or higher, whereas packed columns required temperatures of 20C to 25C to achieve the same results. Packed columns did appear to be superior to the stirred tank in suspended solids reduction. (See also W74-10160) (Shaffer-FIRL)
W74-10179

A DESCRIPTION OF SOME RECENT RESEARCH WORK OF PARTICULAR INTEREST FOR THE INTRODUCTION OF NEW WASTEWATER TREATMENT METHODS IN NORWAY,
Ministry of Environment, Oslo (Norway).
J. Abrahamsen.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 403-422, 1974. 7 fig, 6 tab, 8 ref.

Descriptors: *Waste water treatment, *Treatment facilities, *Nutrient removal, *Biological treatment, *Chemical treatment, Performance, Efficiencies, Design, Cold regions, Costs, Sludge treatment, Phosphorus.
Identifiers: *Norway, *Mechanical treatment.

A review is made of Norway's PRA program which has been surveying the theoretical and practical knowledge of different processes of waste water treatment. Areas in which PRA has concentrated its efforts include: chemical removal of phosphorous salts; operation and study of mechanical, chemical, and biological effects on different recipients of different treated water, and aerobic stabilization of sludge. (See also W74-10160) (Shaffer-FIRL)
W74-10180

AN OVERVIEW OF THE PROBLEMS OF DISINFECTION,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
C. W. Chambers.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 423-437, 1974. 4 fig, 1 tab, 15 ref.

Descriptors: *Disinfection, *Chlorination, *Environmental sanitation, *Temperature, *Cold regions, Costs, Performance, Efficiencies, Bromine, Chlorine, Ozone, Lime, Ultraviolet radiation, Heat.
Identifiers: Bromine chloride, Chlorine dioxide.

A variety of disinfectants are discussed, with primary emphasis on factors having major impacts on the effectiveness of the physical and chemical agents being considered, especially low temperatures. Among the disinfectants considered are chlorine, iodine, bromine and bromine chloride, chlorine dioxide, ozone, ultraviolet light, and heat. Chlorine exhibited lowered disinfectant potency at low temperatures and high pH values. Bromine and bromine chloride exhibit similar responses. Chlorine dioxide would appear unfeasible for Arctic use. Ozone seems a promising alternative but needs more testing. Excess lime creates the need for pH adjustment before release of the effluent. Ultraviolet radiation and heat may have cost constraints. (See also W74-10160) (Shaffer-FIRL)
W74-10181

CHLORINE DISINFECTION OF WASTEWATER,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
C. R. Gordon, C. V. Davenport, and B. H. Reid.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 438-481, 1974. 11 fig, 7 tab, 35 ref.

Descriptors: *Waste water treatment, *Disinfection, *Chlorination, Temperature, *Toxicity, Environmental sanitation, Cold regions, Performance, Efficiencies, *Alaska, Hydraulic structures, Design flow.
Identifiers: Batch flow, Contact time, Plug flow.

A two-phase study was carried out to determine if chlorination could provide satisfactory disinfection of waste water at temperatures less than 1C. The first phase consisted of batch treatment with rapid chlorination and continuous stirring. Four effluents were tested (primary sedimentation system, a 15 day detention time aerated lagoon, and two extended aeration systems). The tests were run at less than 1C with controls run at 25C. Effective disinfection was achieved in all four effluents at less than 1C with a 60 minute contact time and no more than 1 mg/liter residual chlorine. The second phase of the study consisted of running primary sedimentation effluent through a well baffled flow-through chlorine contact chamber at less than 1C. Acceptable reduction of coliforms was not reached in the flow-through chambers at less than 1C until residual chlorine reached 2 mg/liter. Doubling contact time to 120 minutes allowed proper disinfection with only 0.5 to 0.6 mg/liter. Conclusions are drawn, the most important being that contact time appears to be as important as maintenance of a particular chlorine residual level. (See also W74-10160) (Shaffer-FIRL)
W74-10182

LIME DISINFECTION OF SEWAGE BACTERIA AT LOW TEMPERATURE,
Colorado State Univ., Fort Collins. Dept. of Microbiology.
S. M. Morrison, and K. L. Martin.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 482-506, 1974. 9 fig, 3 tab, 21 ref.

Descriptors: *Disinfection, *Temperature, *Lime, *Biochemical oxygen demand, *Phosphates, Performance, Efficiencies, Environmental sanitation, *Waste water treatment, Colorado, Cold regions.
Identifiers: *Orthophosphates.

Studies were conducted to determine: the effects of high pH on raw and treated sewage bacteria at low temperatures (1C to 15C); degree of BOD removal from waste water at high pH and low temperature; effectiveness of lime as a precipitator of orthophosphate from sewage at low temperature. Results showed that raw domestic settled sewage and secondary sewage effluent could be disinfected to a relatively safe level by lime contact for less than 90 minutes at a pH of 11.5 or higher. The high pH lime systems also significantly reduced both BOD and orthophosphate concentrations. Recommendations for additional studies are made. (See also W74-10160) (Shaffer-FIRL)
W74-10183

OZONE DISINFECTION OF WASTEWATERS AT LOW TEMPERATURES,
Cincinnati Univ., Ohio. Dept. of Civil and Environmental Engineering.
R. N. Kinman.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 507-521, 1974. 2 fig, 6 tab, 12 ref.

Descriptors: *Disinfection, *Hydrogen ion concentration, *Ozone, *Temperature, Performance, Efficiencies, Environmental sanitation, *Waste water treatment, Cold regions, Water quality control, Ohio, Coliforms.
Identifiers: Fecal streptococci.

In this study O3 was used to disinfect poorly treated effluents and well treated effluents under low temperature (1C and above) conditions. The pH effect was also tested under these conditions. The study revealed that O3 is more independent of pH effects or temperature effects than any other readily available disinfectant. O3 was found to destroy coliform, total bacteria and Fecal streptococci more rapidly at any pH or temperature than chlorine or iodine. Problems with the use of O3 for arctic treatment facilities are: power costs of generation, need for onsite generation; and the difficulties of O3 transfer from gas to liquid medium. (See also W74-10160) (Shaffer-FIRL)
W74-10184

FEASIBILITY OF PHYSICO-CHEMICAL TREATMENT OF RAW SEWAGE AT LOW TEMPERATURES,
McMaster Univ., Hamilton (Ontario). Dept. of Chemical Engineering.
R. Maqsood, and A. Benedek.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 523-548, 1974. 14 fig, 24 ref.

Descriptors: *Waste water treatment, Sewage treatment, *Water quality control, Temperature, *Chemical treatment, Performance, Efficiencies, Canada, Cold regions, Biochemical oxygen demand, Chemical oxygen demand, Water quality control, Environmental sanitation, *Activated carbon, Feasibility studies.
Identifiers: Granular activated carbon, Powdered activated carbon, *Physico-Chemical treatment.

The article is a discussion of the effects of low temperatures on the performance of Physico-Chemical treatment plants. These units operate after the large particles are removed from the effluent and after it has been treated with metallic coagulants (alum, etc.) and polymeric flocculants. The PTC method employs either Granular Activated Carbon (GAC) or Powdered Activated Carbon (PAC). The use of PAC requires an additional step, the separation by sedimentation of the PAC particles from the sewage. Powdered carbon sludge is not currently susceptible to regeneration though GAC is, by thermal means. The advantages of PTC over biological treatment include: delivery of 10 mg/liter BOD and 30 mg/liter COD on a con-

tinuous basis; insensitivity to hydraulic and organic variations of influent; improved removal of phosphorous and heavy metals. Disadvantages of PTC include: high operating costs and inadequate design and operational experience. Conclusions drawn include: chemical coagulation is influenced by temperature but not to the extent of infeasibility. PAC absorption is little effected by low temperature; and kinetics are temperature dependent but less sensitive than biological processes. (See also W74-10160) (Shaffer-FIRL)
W74-10185

ALASKA VILLAGE DEMONSTRATION PROJECTS: FIRST GENERATION OF INTEGRATED UTILITIES FOR REMOTE COMMUNITIES,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
B. H. Reid.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 549-569, 1974. 6 fig, 11 ref.

Descriptors: *Rural areas, *Community development, *Cold regions, *Waste water treatment, Facilities, Costs, Water conservation, Water demand, Water supply, Water distribution, Water utilization, Incineration, *Alaska.
Identifiers: *Community facilities, *Vacuum toilets.

Under Section 20. Public Law 91-224, April 3, 1970, Congress authorized the Secretary of Interior to carry out the Alaska Village Demonstration Projects (AVDP). The projects were to include, 'provisions for community safe water supply systems, toilets, bathing and laundry facilities, sewage disposal facilities, and other similar facilities'. The projects were assigned to the Office of Research and Development and the Arctic Environmental Research Laboratory. In developing the project concept certain objectives were established, including: the provision of a system of facilities that would be simple, reliable, inexpensive, and yet a real improvement over existing conditions; provide water for domestic use that met Federal and State quality requirements; and treat and dispose of all wastes (air, water, solid) in such a manner as to meet future Federal and State regulations. In achieving these goals some of the following processes and equipment were used: vacuum toilets; separation of grey water from black water; physico-chemical treatment of waste water with reuse in laundering facilities; incineration of black water residue and sludge from waste water treatment; utilization of incinerator heat for building heat; sauna heat, and clothes dryer heat. (See also W74-10160) (Shaffer-FIRL)
W74-10186

PHOSPHORUS REMOVAL BY LIME ADDITION TO A CONVENTIONAL ANAEROBIC STABILIZATION FACILITY,
Environmental Protection Service, Regina (Saskatchewan). Air Pollution Control Branch.
L. J. Lechner, and E. Davis.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 570-586, 1974. 8 fig, 9 ref.

Descriptors: *Waste water treatment, *Phosphorous, *Lime, *Anaerobic digestion, *Temperature, Water quality control, Cold regions, Canada, Performance, Efficiencies, Biochemical oxygen demand, Chemical oxygen demand, Carbon, Suspended solids.
Identifiers: Anaerobic stabilization, Phosphorous removal, Carbonaceous material.

An investigation was conducted to determine the phosphorous removal capacity of three different dosages of lime in an anaerobic lagoon. Secondarily, it was hoped that a determination might be made of the effect of lime on the removal of carbonaceous material. The lime used in this study was a high calcium chemical grade hydrated lime. The efficiency of phosphorous removal at a dosage of 187.5 ppm and 100 ppm were similar, about 82 percent, and little effected by temperature. Removal efficiency at 50 ppm was considerably below the other levels. Percent BOD removal for all three dosages was similar and not above 10 percent greater than the conventional untreated anaerobic process. COD removal was also similar for all three dosage levels. Only the highest dosage produced any increase in the removal of total carbon over that of the untreated lagoon process. The high dosage removed 93 percent of the SS, while the moderate dosage removed 89 percent. The untreated lagoon and the low dosage both removed 84 percent of SS. All dosages appeared to be temperature independent in SS removal. (See also W74-10160) (Shaffer-FIRL)
W74-10187

ODORS FROM CONFINED LIVESTOCK PRODUCTION,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W74-10188

NEW MICROBIAL INDICATORS OF WASTEWATER CHLORINATION EFFICIENCY,
Illinois Univ., Urbana. Dept. of Civil Engineering.
R. S. Engelbrecht, D. H. Foster, E. O. Greening, and S. H. Lee.
Copy Available from GPO Sup Doc as EP1.23:670/2-73-082, $1.15; microfiche from NTIS as PB-234 169 $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-73-082, February 1974. 67 p, 8 fig, 14 tab, 53 ref. EPA Project 17060 EYZ.

Descriptors: *Bioindicators, *Bacteria, Coliforms, *Yeasts, *Chlorination, *Waste water treatment, *Viruses, Public health, Water reuse, Activated sludge, Trickling filters, Resistance, Sewage bacteria.
Identifiers: Enteric viruses, Chlorine resistance, Pour plates, Acid-fast bacilli.

The coliform group of indicator organisms has a relatively low resistance to chlorine when compared to pathogens such as enteric viruses and protozoan cysts. Consequently, an effort has been initiated to find a new chlorine resistant bioindicator of wastewater chlorination efficiency. Organisms surviving chlorination of wastewater effluents to a free chlorine residual were collected for study by plating on various growth media. This procedure provided 135 chlorine resistant isolates for further examination. A yeast and two different acid-fast bacilli were found to be resistant to chlorination in the range considered necessary for the inactivation of pathogens, including viruses. One acid-fast bacillus survived 2.0 mg/l free chlorine for 67 min while the other survived 1.0 mg/l free chlorine for 15 min. The yeast resisted 1.0 mg/l free chlorine for 20 min. In comparison, a pure culture of E. coli failed to survive 5 min contact with 0.03 mg/l free chlorine. Acid-fast staining of colonies on membrane filters incubated on mineral-propionate medium, following sample pretreatment with oxalic acid and NaOH provided a selective assay technique for acid-fast organisms. Significant quantities of yeasts and acid-fast organisms were found in wastewater effluents and yeasts have been isolated from stools. The chlorine resistance and other characteristics of the yeasts and acid-fast bacilli under study suggest that they show promise as bioindicators for wastewater chlorination efficiency for the more chlorine resistant pathogens. (EPA)
W74-10189

OPTIMIZATION AND DESIGN OF AN OIL ACTIVATED SLUDGE CONCENTRATION PROCESS,
Esso Research and Engineering Co., Linden, N.J.
T. M. Rosenblatt.
Copy Available from GPO Sup Doc as EP1.23:670/2-74-004, $1.40; microfiche from NTIS as PB-234 173 $1.45. Environmental Protection Agency, Technology Series Report EPA-670/2-74-004, February 1974. 191 p, 16 fig, 51 tab, 55 ref, 4 append. EPA Project 17070-HDA. 68-01-0095.

Descriptors: *Activated sludge, *Waste water treatment, *Separation techniques, Drying, Dewatering, *Oil wastes, Pilot plants, *Sewage disposal, Incineration, Cost analysis, *Design, *Optimization, Sewage sludge.
Identifiers: Oil-assisted dewatering, Drying secondary sewage sludge, Thickening, Gravity separation.

Laboratory and pilot plant studies are described for a new Esso-Carver Greenfield process for the disposal of sewage sludge. An oil-assisted gravity separation of the majority of the water while heating is followed by multiple effect evaporation to dryness in an oil slurry, and incineration of the dry solids. Agreement between laboratory and pilot plant results was good, indicating no scale-up problems. In the gravity separation, secondary sludges are concentrated from about 0.5% up to 5-10% solids. Solids capture of 98% or more is achieved by high shear oil-sludge contacting. Temperature dependent losses of solubilized organic carbon up to about 25% of the organic content of the feed are observed in the separated water from the oil concentration, and in the distillate from the evaporators. The process economics show an advantage of $13-32 a ton compared to the best known commercial technology: total costs are estimated at $21-39/ton of dry solids for a 189 ton/day plant processing a 50/50 mixture of primary + activated sludges to ash. A lower temperature gravity separation step could greatly reduce the economic penalty for a 25% recycle of solubilized secondary sludge, and yield an improvement of $1-12/ton of dry solids depending on plant size and sludge type. Other cost reductions in the thickening and settling steps could amount to $1-5/ton dry solids. (EPA)
W74-10192

STORAGE AND DISPOSAL OF IRON ORE PROCESSING WASTEWATER,
Michigan Technological Univ., Houghton. Dept. of Civil Engineering.
C. R. Baillod, and G. R. Alger.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-018, $1.80; microfiche from NTIS as PB-234 180 $1.45. Environmental Protection Agency, Technology Series Report EPA 660/2-74-018, March 1974. 135 p, 37 fig, 20 tab, 27 ref, 6 append. EPA Project 14040FVD.

Descriptors: *Mine wastes, Sedimentation, Hydrology, *Coagulation, Industrial wastes, Sediment transport, Impoundments, *Michigan, Lake Superior, *Iron, *Waste water treatment, *Dewatering, Waste disposal, Storage.
Identifiers: Tailings basins, Iron ore beneficiation, Taconite waste, *Thickening, Vacuum filtration.

This study was concerned with the handling of wastewater resulting from the concentration of low grade iron ore. Specific objectives were to develop tailings basin design and management criteria, to investigate methods of treating basin effluents, and to investigate transport characteristics of particulate materials contained in basin discharges. These objectives were accomplished through laboratory and field studies conducted at the tailings impoundment systems associated with two iron ore concentrating plants located in Upper Michigan. Annual water balances were formulated for the tailings system at each plant to show the relative importance of precipitation, surface outflow and seepage. Settling column and dye disper-

sion tests were employed to predict concentrations of suspended material remaining in basin effluents. The cost effectiveness of various coagulation systems for treating basin effluent was investigated. Particular attention was devoted to a study of the thickening and dewatering characteristics of the slurry produced by chemical coagulation of the basin effluent. Synthesis of alternative systems for handling tailings wastewater was hampered by a lack of information on water quality requirements for reuse within ore concentrating processes. Finally, settling column experiments in which fine tailings particles were diluted with various natural waters were conducted. (EPA)
W74-10193

COMBINED SEWER OVERFLOW ABATEMENT PLAN, DES MOINES, IOWA,
Henningson, Durham and Richardson, Inc., Omaha, Nebr.
P. L. Davis, and F. A. Borchardt.
Copy Available from GPO Sup Doc as EP1.23/2:73.170, $3.20; microfiche from NTIS as PB-234 183 $1.45. Environmental Protection Agency, Technology Series Report EPA-R2-73-170, April 1974. 311 p, 79 fig, 26 tab, 20 ref, 4 append. EPA Project 11024 FEJ. 14-12-402.

Descriptors: *Overflow, *Combined sewers, *Storm runoff, Water quality, *Waste water treatment, Rainfall-runoff relationships, Capital costs, Operating costs, *Iowa, *Biochemical oxygen demand, Waste characteristics, Water pollution sources.
Identifiers: Combined sewer separation, Combined sewer overflow abatement, Detention ponds, *Des Moines(Iowa).

Combined sewer overflows, storm water discharges, and surface waters in the Des Moines, Iowa Metropolitan Area were samples for 12 months to determine their pollutional characteristics. Various systems of separation and collection and treatment of combined sewer overflow and storm water discharges were designed, estimated and evaluated. Analyses were made of the data collected and of the various system problems encountered. The studies indicate 174,500 pounds of BOD are discharged annually from a 4,000 acre combined sewer drainage area, and 2,668,000 pounds of BOD from 45,000 acres served by separate storm sewers. Average concentrations of pollutants in storm water were 53 mg/l BOD, 448 mg/l SS, 1.78 mg/l NH3-N, 1.10 mg/l NO3-N, and 1.65 mg/l Total PO4. Average concentrations of pollutants in combined sewer overflows were 72 mg/l BOD, 329 mg/l SS, 4.79 mg/l NH3-N, 0.74 mg/l NO3-N, and 8.92 mg/l Total PO4. Several combined sewer overflow abatement projects are recommended for implementation. (Field-EPA)
W74-10194

RENOVATION OF SECONDARY EFFLUENT FOR REUSE AS A WATER RESOURCE,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
L. T. Kardos, W. E. Sopper, E. A. Myers, R. R. Parizek, and J. B. Nesbitt.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-016, $4.80; microfiche from NTIS as PB-234 176 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-74-016, February 1974. 495 p, 134 fig, 165 tab, 112 ref, append. EPA-16080-DYJ (Formerly WPD-95-04).

Descriptors: *Waste water treatment, Filters, *Sewage effluents, *Land disposal, *Water reuse, *Phosphorus removal, Water pollution, Nitrates, Boron, Goundwater recharge, Sprinkler irrigation, Crop production, Tree growth, Oxygen diffusion, Exchangeable cations, Bray phosphorus, Nutrient removal efficiency, Monitoring, Suction lysimeters, Trench lysimeters, Piezometers, Runoff, Deep wells, Annual costs, *Pennsylvania.
Identifiers: Corn(Silage), Reed canarygrass, White spruce, Red pine, Hardwoods, *Hublersburg clay loam, *Morrison sandy loam, State College(Penn).

Sprinkler application of chlorinated secondary sewage effluent at levels of 1 or 2 in/wk during the growing season or year-round increased crop yields and forest tree growth except for red pine at the 2 in/wk rate. Harvested crops removed large amounts of nitrogen and phosphorus, the two key eutrophication nutrients. N and P content of forest foliage was increased but the nutrients were recycled through the litter. NO3-N in suction lysimeter samples at 4 feet were less than the U.S.P.H.S. limit of 10 mg NO3-N1. except in the growing season-2 in/wk red pine on Hublersburg silt loam and year-round, 2 in/wk hardwood on Morrison sandy loam, where the values were 2 to 4 times the U.S.P.H.S. limit. P conc. in the same samples was no greater than in untreated control areas and had decreased 98 to 99%. Only one deep monitoring well showed higher NO3 and Cl- conc. definitely ascribable to the effluent irrigation but still met U.S.P.H.S. drinking water standards. Recharge within one 43.5 acre site was estimated at 65 million gallons per year and resulted in lower pumping costs in two nearby University water supply wells. Annual costs of a sprinkler irrigation system to recycle sewage effluent through the land as a living filter were estimated to range from $13/EDU for 1MGD to $8/EDU for 10MGD. Data are also reported on hydrologic studies, boron studies, aeration studies, phosphorus adsorption studies and soil chemical changes. (EPA)
W74-10197

DEMONSTRATION OF THREE RECIRCULATING SWINE WASTE MANAGEMENT SYSTEMS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
J. R. Miner, T. E. Hazen, R. J. Smith, and G. B. Parker.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-009, $1.90; microfiche from NTIS as PB-234 179 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-74-009, December 1973. 147 p, 48 fig, 26 tab, 29 ref. EPA Project 13040 ERR.

Descriptors: *Waste water treatment, Farm wastes, Waste disposal, *Water reuse, *Hogs, *Hydraulic transportation, *Demonstration farms, Farm lagoons, Aerobic treatment, Biological treatment, Irrigation, Odors, Nitrogen, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: *Swine wastes, *Flushing gutters, Flush tanks, Rotating biological contactors, Anaerobic lagoons, Aeration basins, Land application.

Three waste treatment systems were used to process liquid swine manure so the effluent could be reused as flush-water. Hydraulic transport was effective in removing manure from all eight buildings. Excess liquid from all three systems was applied to adjacent cropland to achieve nutrient utilization as the final disposal step. Reductions in building odors, manure handling labor, and land requirements for final effluent disposal were major goals of the demonstration. An aeration basin received the manure from two farrowing buildings with a capacity for 14 sows each. As anticipated, solids accumulated in the aeration basin. When the solids content exceeded 4,500 mg/l plugging problems became frequent in the pump and piping system. A lagoon-aeration basin system served two farrowing buildings with a capacity for 28 sows each. The system performed adequately with only minor mechanical difficulties. A lagoon-RBC system served four finishing buildings with a total capacity of 700 hogs. Frequent mechanical and biological failure resulted in removal of the RBC from use. Lagoon effluent is being used to flush these buildings with success. Repeated outbreaks of vibrionic dysentery has prompted remodelling two of the buildings and flushing in a gutter covered with slats. (EPA)
W74-10198

A DEMONSTRATION OF THERMAL WATER UTILIZATION IN AGRICULTURE,
Eugene Water and Electric Board, Oreg.
J. W. Berry, and H. H. Miller, Jr.
Copy Available from GPO Sup Doc as EP1.23:660/2-74-011, $2.80; microfiche from NTIS as PB-234 178 $1.45. Environmental Protection Agency, Technology Series Report EPA-660/2-74-011, April 1974. 237 p, 65 fig, 39 tab, 51 ref. EPA S802032.

Descriptors: *Beneficial use, Industrial water, *Thermal water, *Water utilization, Heated water, Water pollution control, *Thermal pollution, Agriculture, *Frost protection, Irrigation water, *Soil-water-plant relationships, Soil temperature, *Water reuse, *Oregon.
Identifiers: Waste heat use in agriculture, Thermal pollution control, Soil heating, *McKenzie River(Ore).

A five-year demonstration project was conducted to determine benefits and identify harmful effects of using waste heat in condenser cooling water (90 deg F-110 deg F) for agricultural purposes. Initial phases of the demonstration emphasized the use and evaluation of warm water for spring frost protection, irrigation, and plant cooling during summer. Various row crops and fruit and nut trees were included in the evaluation. Undersoil heating was demonstrated on a 1.2 acre soil plot. Two and one half inch plastic pipes were buried 26 inches deep and 5 feet on center, connecting to 6 inch steel headers. Warm water was circulated through the grid, heating soil on which row crops were grown. A plastic greenhouse (22ft x 55ft) was constructed on a portion of the undersoil heat grid. Greenhouse crop production was thoroughly evaluated. Conclusions indicate that the greatest potential benefit of waste heat use in agriculture is in the area of greenhouse soil heating. Monetary benefits from industrial waste heat appear achievable through proper management. (Christianson-EPA)
W74-10199

THE SWIRL CONCENTRATOR AS A GRIT SEPARATOR DEVICE,
American Public Works Association, Chicago, Ill.
R. H. Sullivan, M. Cohn, J. E. Ure, and F. Parkinson.
Available from the National Technical Information Service as PB-234 175 $8.00 in paper copy, $1.45 in microfiche. Environmental Protection Agency, Cincinnati, Ohio, Technology series, Report EPA-670/2-74-026, June 1974. 92 p, 60 fig, 7 tab, 3 append. Grant No. EPA 11023 GSC (S-802219).

Descriptors: Design, *Wastewater treatment, Combined sewers, *Sewage treatment, Flow rate, *Separation techniques, Hydraulic models.
Identifiers: *Swirl concentrator, Combined sewer overflow regulation, Recovery rate, *Grit chambers, *Grit removal, Swirling(Separation).

A study was conducted by the American Public Works Association to determine the applicability of a swirl concentrator chamber to perform the functions of a grit separation and removal facility. The swirl concentrator principle was originally developed in Bristol, England, and subsequently modified and applied by the APWA to act as a combined sewer overflow regulator. The ability of the swirl flow pattern to effectively remove solids of particular sizes or specific gravities was noted during the first study. This hydraulic flow configuration was developed and adapted to effectively remove grit from either the underflow from the combined sewer overflow regulator or from domestic sanitary sewage. Hydraulic model studies were used to develop optimum design configurations. For an average flow of 0.084 m cubed/sec (3 cfs), the diameter of the unit would be 2.19 m (7.2 ft) and 1.1 m(3.6 ft) deep. The efficiency of removing grit particles of 2.65 sg and size greater than 0.2 mm will be equal to that of con-

ventional grit removal devices. The unit has no moving parts. Conventional grit washers and lifts can be employed. The complete report on studies carried out on a swirl grit removal model by the LaSalle Hydraulic Laboratory Ltd. is included as an appendix. (See also W73-05214) (EPA)
W74-10201

VISCOSITY ACTUATED PHASE SEPARATING (VAPS), FOR OIL-WATER SEPARATIONS,
Union Carbide Corp., Bound Brook, N.J. Chemicals and Plastics.
For primary bibliographic entry see Field 5G.
W74-10231

THERMOPHILIC AEROBIC DIGESTION OF ORGANIC SOLID WASTES,
Clemson Univ., S.C. Dept. of Environmental Systems Engineering.
J. F. Andrews, and K. Kambhu.
Available from NTIS, Springfield, Va 22151 as PB-222 396 Price $6.25 printed copy; $1.45 microfiche. Environmental Protection Agency Report EPA-670/2-73-061, August 1973. 76 p, 18 fig, 6 tab, 55 ref. EPA/EP-00268.

Descriptors: *Waste disposal, *Sludge disposal, *Aerobic treatment, Oxygen demand, Recycling, Biodegradation, *Waste water treatment, *Mathematical models.
Identifiers: *Thermophilic aerobic digestion.

Thermophilic aerobic digestion is proposed to treat wastewater sludge and garbage. The major reactions involved in the process are discussed. Volatile solids destruction, oxygen utilization, and carbon dioxide production are calculated stoichiometrically for both ammonia and nitrate as products of organic nitrogen oxidation. A simple procedure relates heat production to the oxygen equivalent or COD of the organic solids. Simulation studies and mathematical models employ conservative values of biological parameters. The mathematical model provides assistance in planning and conducting pilot plant studies. (Knapp-USGS)
W74-10236

ESTIMATED RAINFALL FOR DRAINAGE CALCULATIONS IN THE UNITED KINGDOM,
Transport and Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 2B.
W74-10241

SEPARATION AND RECOVERY SYSTEMS, INC., 100-GALLON-PER-MINUTE OIL/WATER SEPARATOR,
Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 5G.
W74-10248

DEVELOPMENT OF A POLLUTION-FREE CARGO TANK CLEANING SYSTEM FOR USE ON BOARD TANKERS,
State University of New York Bronx. Maritime Coll.
J. Femenia.
Available from NTIS, Springfield, Va 22151 as COM-73-11188 Price $3.75 printed copy; $1.45 microfiche. New York State Sea Grant Program Report, June 1973. 75 p, 19 fig, 7 tab, 8 ref, 2 append. NOAA Sea Grant 2-35281.

Descriptors: *Cleaning, *Oil wastes, Ships, Water pollution control, Sea water, Oily water, Pollution abatement, *Waste water treatment, Brines, Sulfate, Magnesium compounds.
Identifiers: *Oil tankers, *Magnesium sulfate.

A pollution free cargo tank cleaning system is proposed. The basic system operates in closed tanks using magnesium sulfate brine as the recirculated cleaning fluid. The effects of using this brine in lieu of seawater for washing tanks are described. The preliminary design of a practical shipboard system, including the separator, is included together with basic operating and maintenance procedures. (Knapp-USGS)
W74-10249

REFINERY EFFLUENTS NEED EFFICIENT CONTROL.
Energy Digest, Vol 3, No 1, p 37-39, January/February, 1974. 2 tab.

Descriptors: *Effluents, *Oil, Flocculation, *Waste water treatment, Sewage treatment, Activated sludge, Aeration, Separation techniques, Gas, Water pollution, Sulphur, Legislation, Biological treatment, Water quality.
Identifiers: *Refineries, Effluent control.

Refineries share the major problem of effluent control. Three components make up effluent water: process steam, mixed with oil vapors which condense and separate into oil and water; rain water in drainage areas which must be treated to separate the oil they have picked up enroute; and water employed for cooling purposes. These three water streams are generally treated separately, by gravity separation, flocculation with chemicals, biological treatment, activated sludge treatment, or air flotation plants. The type and degree of water treatment required is dependent upon the volume of the water, the quality, and the size of the receiving water. In addition, radioactive material can be a problem. Considered too, are problems relating to pollution by the gas industry and lack of effective sulphur legislation. (Prague-FIRL)
W74-10274

EFFLUENT WATER TREATMENT BY CONTACTING WITH PLANT TISSUE.
Hitachi Ltd., Tokyo (Japan).
Netherlands Patent 7312-237. Issued March 3, 1974. Derwent Netherlands Patents Report, Vol 5, No 12, p 4, March, 1974.

Descriptors: *Patents, *Effluents, *Waste water treatment, *Plant tissues, Heavy metals, Equipment, Waste removal, Water purification, Absorption, Detergents, Alkylbenzene sulphonates.

Water is contacted, such as in a column or a stirred vat, with plant tissue (stalks and leaves of barley, rice, wheat, sugar cane, soya beans, saw dust, shavings, twigs of cut woods, pampas grass, nettles, wisteria). The process absorbes impurities and gives excellent removal of heavy metal compounds, basic and direct dyestuffs and surfactants such as alkylbenzene sulphonates. (Prague-FIRL)
W74-10275

TREATMENT OF AQUEOUS WASTE STREAMS CONTAINING A WATER-SOLUBLE SULFIDE COMPOUND.
Universal Oil Products Co., Melbourne (Australia).
Australian Patent 444,809. Issued February 7, 1974. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 4, p 349, February 7, 1974.

Descriptors: *Patents, *Aqueous solutions, *Sulfides, Oxidation, Catalysts, Effluents, Liquids, Streams, *Waste water treatment, Solubility.
Identifiers: *Waste streams, Water-soluble compounds, Polysulfides, Australia.

A method for the treatment of aqueous waste streams containing a water-soluble sulfide compounds was comprised of three steps. These are: (1) to contain the aqueous waste stream and oxygen in an amount less than 0.5 moles of 02 per mole of the sulfide compounds with a first solid oxidizing catalyst at oxidizing conditions, including a relatively low pressure and temperature, sufficient to form a first effluent stream containing a water-soluble polysulfide; (2) to contact the first effluent stream and oxygen with a second solid oxidizing catalyst at oxidizing condition, including a temperature greater than the melting point of sulfur and pressure to maintain a portion of the first effluent stream in liquid phase; and (3) to separate the liquid sulfur from the second effluent stream to produce a treated aqueous stream which is substantially free of the sulfide compound. (Prague-FIRL)
W74-10276

DEPOLLUTION TECHNIQUES AND MANAGEMENT IN AN OIL REFINERY,
Indian Inst. of Petroleum, Dehra Dun.
S. Chakravarty, and H. K. Mulchandani.
Chemical Age of India, Vol 24, No 12, p 819-826, 1973. 2 fig, 5 tab, 6 ref.

Descriptors: *Oil, *Waste water treatment, *Industrial wastes, *Water pollution, Effluents, Biochemical oxygen demand, Flocculation, Flotation, Suspended solids, Lagooning, Sulphur, Air pollution, Noise pollution, Costs, Contaminants, Hydrogen ion concentration.
Identifiers: *India, Oil refineries.

With increasing demand for petroleum products and an expansion of the refining capacity of India, associated effects of pollution occur. Legislation is now being formulated to stipulate and regulate levels of acceptable pollution. Discussed are waste water management, air pollution, and noise pollution. Refinery waste streams systems can be classified as: sanitary water systems, clean water, oily water, ballast water systems, and foul and oily process water systems. The waste water flow scheme for a refinery includes pH control, an API separator for the removal of oil, flocculation/flotation methods for the removal of suspended solids and oil, and a biological treatment system for the reduction of BOD. Treatment and disposal of effluent leads to the following considerations: sludge and its disposal, and acid sludge disposal by either burning, thermal decomposition and sulphur recovery, lagooning, or neutralization and dumping. Apart from the waste purification system, plant design is discussed in terms of economics and reducing the quantity of either waste water or contaminant. (Prague-FIRL)
W74-10280

FILTRATION MECHANISMS DURING THE REMOVAL OF CONTAMINANTS FROM NITRIC ACID,
Geological Survey, Tallahassee, Fla.
K. V. Rybakov, V. P. Kovalenko, and L. M. Rozanova.
International Chemical Engineering, Vol 14, No 2, p 263-264, April, 1974. 2 fig, 2 ref.

Descriptors: *Waste water treatment, *Filtration, *Sludge, *Clarification, Simulation, Mathematical studies, Investigations, Nitrogen, *Filters, Pores, Removal, Wastes.
Identifiers: *Nitric acid, Sludge formation, Filter media.

The filtration process can proceed, even with complete clogging of the pores, with sludge formation. In order to determine the filter surface area for clarification by filtration, it is necessary to establish the mechanisms which describe the process under given specific conditions. Illustrated are graphic methods for calculating the nitric acid filtration process using various filter media. The process is found to take place by a sequential two-stage mechanism. This involves first, the partial clogging of the pores of the filter media and second, the sludge formation. (Prague-FIRL)
W74-10281

DEHYDRATION OF SOLIDS BY CHEMICAL FRACTIONATION.
Boeing Co., Seattle, Wash.
For primary bibliographic entry see Field 5G.
W74-10282

TREATMENT OF WASTE WATER,
Phillips, Ormonde and Fitzpatrick, Melbourne (Australia).
M. Zuckerman, and A. Molof.
Australian Patent 444,933. Issued February 7, 1974. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 4, p 375, February 7, 1974.

Descriptors: *Patents, *Waste water treatment, Organic matter, *Hydrolysis, *Solubility, Molecular weight.

A process for the treatment of non-biologically treated waste water containing high molecular weight soluble organic materials is comprised of two steps. These are: hydrolyzing the high molecular weight soluble organic material in the waste water to yield a hydrolyzed product containing low molecular weight soluble organic materials; and removing at least part of the soluble low molecular weight organic material from the waste water. (Prague-FIRL)
W74-10283

WATER DESALTING,
For primary bibliographic entry see Field 5E.
W74-10284

A SOLUTION TO A SOLUTION PROBLEM.
Effluent and Water Treatment Journal, Vol 14, No 2, p 103-104, February, 1974. 2 fig.

Descriptors: *Effluents, *Industrial wastes, *Costs, *Standards, Water pollution, *Treatment facilities, Lime, Design criteria, Maintenance, Water pollution control, *Waste water treatment.
Identifiers: Solution Silo.

Problems of design for treatment of effluents from industry must take into account costs and rising standards of pollution control. For example, acid effluents must be neutralized and a common method of treatment is to mix a solution of lime or soda ash in correct proportion with the effluent. The treatment plant required for this type of process is a nonproductive capital investment. J. T. Scotney Limited of Hull has developed a packaged unit called the composite Solution Silo. This consists of a cylindrical vessel, the upper section being the powder silo and the lower section forming an insulated plant room, complete with lockable double doors and interior lighting. Designs have built-in alarm systems to provide remote warning of any malfunctions. Its purpose is to rationalize industrial plant and reduce extraneous installation, commissioning, and maintenance costs. (Prague-FIRL)
W74-10286

SONOCO OFFERS NEW APPROACH TO SULPHITE CHEMICAL RECOVERY.
Paper Trade Journal, Vol 158, No 14, p 22-23, April 8, 1974. 1 fig.

Descriptors: *Sulphite liquors, *Water reuse, Aluminum, Sodium, Water pollution, Chemistry, Water streams, Pulp and Paper industry, *Pulp wastes, Industrial wastes, Sulphur, Organic matter, *Waste water treatment.
Identifiers: *Residual liquors, Solid state liquors, *Recovery(Chemicals).

A significant development was made towards solving the problem of pollution and costs by recovering sodium base spent sulphite liquors and marketing products produced from them. This spent liquor was acidified and the organic acids extracted. The residual liquor was also sold as a salt cake substitute. Burning of the liquor was done in the solid state in conventional equipment, a less costly process than ordinary recovery furnaces, using new aluminum complexes. A flow diagram explains the many steps of the process. Basic chemistry and required equipment are also detailed. The significant results of this system are that a major portion of the chemicals required in the pulping process are reusable; no significant odors are generated from the pulping or the recovery processes; a new basic chemistry for recovery of sodium base sulphite pulping liquor has been tested on a plant scale; the process is economically competitive. This sulphite chemical recovery system should be applicable to any independent sodium base neutral sulphite semi-chemical pulp mill and for sodium base sulphite pulp mills practicing full chemical cooking. (Prague-FIRL)
W74-10287

THE EFFECT OF DISSOLVED HYDROCARBON GASES IN SURFACTANT SOLUTIONS ON FROTH FLOTATION OF MINERALS,
Henry Krumb School of Mines, New York.
P. Somasundaran, and B. M. Moudgil.
Journal of Colloid and Interface Science, Vol 47, No 2, p 290-308, May, 1974. 5 fig, 1 tab, 23 ref.

Descriptors: *Organic compounds, Industrial wastes, *Gases, *Surfactants, *Froth flotation, Minerals, Surface tension, Flotation, Methane, Adsorption, *Waste water treatment, Aqueous solutions.
Identifiers: Salting-out effects, Hydrophobic band formation.

Surface tension properties of hydrocarbon saturated solutions have been measured and indicated absorption of the gas molecules at the solution/air interface. Selective effects of the dissolved hydrocarbons on froth flotation of minerals are discussed on the basis of possible changes in the properties of the solution surface and the mineral/solution interface. Mechanisms responsible for the effects on flotation were demonstrated; for example, methane dissolved in sodium dodecylsulfonate collector solutions was found to increase the flotation of alumina by 10 to 30 percent. Flotation of quartz or hematite was not affected by the presence of dissolved methane or butane. A new automated constant-pressure apparatus for dissolution studies the solubility of gases to be lower in surfactant solutions than in water when the surfactant concentration was low, and higher than in water when the concentration was high. This is explained on the basis of the predominance of the 'salting-out' effect at lower surfactant concentrations and the hydrophobic bond dormation between the hydrocarbon molecule and the surfactant chains at higher concentrations. (Prague-FIRL)
W74-10288

CANADA: SEVERE PROBLEMS.
Paper Review of the Year, p 74, 76-78, 80, 101, 1973. 1 tab, 1 ref.

Descriptors: *Pulp and paper industry, *Canada, Water pollution control, *Costs, Legislation, *Pulp wastes, Aeration, Lagoons, Monitoring, Fish, Water quality control, Recovery, Equipment, Machinery, *Incineration, *Waste treatment, *Waste water treatment.
Identifiers: *Fluidized bed reactor, Waste fibers.

Canadian pulp and paper industry has been heavily taxed and has had severe economic problems due to increasing costs of pollution control measures defined by governmental legislation. Improvements described include a fluidized bed reactor which incinerates all non-usable wastes together with general mill debris and sludge from the effluent system of the mill, without creating atmospheric pollution. The reclamation of waste fiber materials is described. Liquid waste is aerated in collecting lagoons. Monitoring stations will check the quality of water. The mixture of effluent waters and river water will be simulated in a fish aquarium to check water quality. A recovery furnace and boiler will be installed. Specific equipment and machinery for these and other processes are described. (Prague-FIRL)
W74-10289

WASTEWATER SYSTEM ALTERNATES: WHAT ARE THEY...AND WHAT COST,
Anderson-Nichols and Co., Boston, Mass. Environmental Sciences Div.
R. P. Monti, and P. T. Silbermann.
Water and Wastes Engineering, Vol 11, No 5, p 40-48, 75, May, 1974. 10 fig.

Descriptors: *Waste water treatment, *Ozonation, *Biochemical oxygen demand, Aeration, Filtration, Phosphates, Effluents, Standards, Chemical precipitation, Aluminum, Salts, Legislation, Navigable waters, *Alternative planning.
Identifiers: *Zero discharge, *Phosphorus removal.

Objectives and actions are described for achieving zero discharge and effecting better waste water treatment methods. To achieve the high degree of BOD reduction and nutrient removal to reach required discharge levels, a two-stage chemical precipitation with aluminum and ferric salts, and three-stage aeration followed by sand filtration, carbon column filtration, disinfection, and final effluent aeration is recommended as a waste water treatment. Phosphorus removal systems are discussed and a chemical system of removal was agreed upon as most efficient. Ozonation and its advantages and potentials are also summarized. All of the waste water treatment processes outlined are facilities oriented to comply with the 1985 discharge limitations to navigable waters mandated by Congress. (See also W74-09718) (Prague-FIRL)
W74-10290

PLANT TREATS WASTES FROM AIRCRAFT ENGINE TESTING.
Water and Pollution Control, Vol 112, No 3, p 34-36, 39, March, 1974. 2 tab.

Descriptors: *Industrial wastes, *Effluents, Toxicity, Inorganic matter, Alkalines, Acids, Chemical wastes, Tanks, Recycling, Equipment, Control, *Treatment facilities, *Waste water treatment, *Canada.
Identifiers: Chromates, Cyanide, Phosphoric acid.

The expansion of facilities at Air Canada, Dorval, Quebec included the expansion of the overhaul and maintenance building where jet engines were to be serviced. This necessitated an effluent handling system designed to deal with toxic inorganic wastes from metal stripping, cleaning, and plating processes. Wastes stemmed from two sources, batch solutions into which the metal parts were dipped, and rinse waters. They consisted of cyanides, alkaline permanganates, caustic soda, and a variety of acids. Due to the variety of processes, chemical solutions, and tanks, recycling systems were not economically practical and a destruction treatment was necessary. Specifically treated were chromate wastes, cyanide wastes, solutions containing hydrofluoric and phosphoric acids, alkaline permanganates, concentrated general acids, and concentrated alkalies. Equipment is described. All tanks have overflow pipes, controlled by continuous automatic treatment panels located on the floor above. (Prague-FIRL)
W74-10291

WHAT'S NEW IN SLIME AND DEPOSIT CONTROL,
A. W. J. Dyck.
American Paper Industry, Vol 56, No 6, p 16-17, May, 1974. 1 tab.

Descriptors: *Slime, *Pulp and paper industry, *Mercury, Aquiculture, Fish, Legislation, Products, Pulp wastes, Waste water treatment.
Identifiers: *Slimicides, Slime control agents.

Slimicides are a part of the pulp and paper mill process and previously were mercurial compounds. However, mercurials were found a threat to fish and other aquatic animals as well as dangerous to mill personnel. Non-mercurials which replaced these as slime control agents were not as effective. More efficient biocides are being sought; described are four companies' products--Merck's Metasol J-26, Nalco's products, Dow's Slimicide XD-7287L, and Betz's Slimicide DE-508. (Prague-FIRL)
W74-10293

CONFERENCE PAPERS, NATIONAL DAIRY HOUSING CONFERENCE.
Conference held at Michigan State University, East Lansing, February 6-8, 1973. American Society of Agricultural Engineers, St. Joseph, Michigan Special Publication SP.01-73, 1973. 469 p, 53 fig, 17 tab, 69 ref.

Descriptors: *Dairy industry, *Farm wastes, *Waste water treatment, *Waste disposal, *Waste storage, *Environmental control, Legal aspects, Regulation, Air pollution, Water pollution, Economics.
Identifiers: Free-stall housing, *Stall barns, Composting.

The National Dairy Housing Conference was an attempt to bring appropriate disciplines together to focus on the subject of dairy housing. Emphasis was on practical information for use by people in the field. Subjects included: free-stall housing, stall barns, herd health, environmental control, codes and regulations, milking systems planning, feeding systems, calf and youngstock housing, milkhouse and milking parlor wastes, and manure management. (See W74-10298 thru W74-10312) (Janssen-East Central)
W74-10297

CONVENTIONAL STALL BARNS WITH GUTTER GRATES AND LIQUID MANURE STORAGE,
Dept. of Agricultural Engineering. Minnesota Univ., Minneapolis.
D. W. Bates.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973. p 99-107, 1973. 5 fig, 5 ref.

Descriptors: *Waste storage, *Liquid wastes, *Dairy industry, Cattle, Ventilation, Odor, *Minnesota, *Farm wastes, Waste water treatment.
Identifiers: *Stall barns, *Manure storage tanks, Gutter grates.

Dairymen in cold climates have begun to employ manure storage tanks 9 months of the year. For the new dairy barn, a practical place to store manure is directly beneath the barn for removal as a liquid. With this method the wall of the manure tank can act as a foundation for the barn and the floor of the barn can serve as the cover for the manure tank. By using gutters with grated bottoms, manure and urine drop directly into the storage pits, and the need for a gutter cleaner is eliminated. A garden rake may be used to work through manure that hangs on the grates. Typical construction details for such a system are outlined. Already existing dairy barns usually have to employ an external manure tank. The gutter cleaner elevator can be modified so manure will drop directly into the tank. Careful planning and management is essential for the success of either system. (See also W74-10297) (Janssen-East Central)
W74-10298

SUMMER ENVIRONMENTAL MODIFICATION SYSTEMS FOR DAIRY COW HOUSING IN THE UNITED STATES,
Agricultural Research Service, Columbia, Mo.
L. Hahn, D. D. Osburn, and J. D. McQuigg.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973. p 134-141, 1973. 3 fig, 12 ref.

Descriptors: *Dairy industry, *Environmental control, Productivity, United States, Odor, Moisture, Ammonia, Air conditioning, Costs, *Seasonal.
Identifiers: *Summer environmental modification systems, Housing, Evaporative cooling, Partial air conditioning.

Protective shelters for dairy cows are adequate in many areas of the United States, considering the normal levels of milk production and the relatively small regions of adverse summer climates. However, for high-producing cows in hot-dry or hot-humid climates, milk-production losses which are a result of the direct influence of climatic factors can be a severe problem. Managers of dairy herds in such areas should consider adopting an environmental modification system for improved production. The form of modification adopted must be rationally selected; not all systems are profitable. The optimum environment for maximum production is not the economic optimum for current costs and returns. Of the alternative systems considered, evaporative cooling appears to have the most potential for application in areas with hot summer climates. (See also W74-10297) (Janssen-East Central)
W74-10299

POTENTIAL ECONOMIC IMPACTS OF STATE POLLUTION CONTROLS ON DAIRY FARMS,
Michigan State Univ., East Lansing. Dept. of Agricultural Economics.
L. J. Connor, and J. B. Johnson.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973. p 182-191, 1973. 1 tab, 4 ref.

Descriptors: *Economic impact, *Legal aspects, *Dairy industry, *Farm wastes, *Waste treatment, *Waste disposal, Water pollution, Air pollution, Feed lots, Cattle, Michigan.
Identifiers: *State pollution controls, State statutes.

Changes in livestock production and concern for the environment have resulted in enactment of varied state statutes concerning pollution problems associated with livestock production facilities and waste disposal areas. The impact of state legal controls varies according to the type of legal control enacted, herd size, housing-waste handling systems, and specific location variables. A Michigan study illustrates the varying impacts upon dairy farms that would accrue with specific herd size and housing-waste handling systems for each of three selected legal pollution controls. Individual dairy farmers are advised to exercise caution in making any expansion or adjustments in their business, and in evaluating any potential environmental problems in their farms. (See also W74-10297) (Janssen-East Central)
W74-10300

DESIGN OF MILKING CENTER WASTE MANAGEMENT SYSTEMS,
Cornell Univ., Ithaca, N.Y. Dept. of Agricultural Engineering.
R. T. Lorenzen, and R. W. Guest.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 349-358, 1973. 2 fig, 1 tab, 11 ref.

Descriptors: *Dairy industry, *Design, *Farm wastes, *Waste treatment, *Waste disposal, *Waste storage, Lagoons, Biochemical oxygen demand, Septic tanks, Milk.
Identifiers: *Milking center, *Waste management systems, Aeration ponds, Effluent quantity, Settling tank.

Design data from several recent studies are applied to the collection, treatment, storage, and disposal systems for handling milking center wastes. Included are parameters for quantity, physical constituents, and biological degradation of milk room wastes, milking parlor wastes, and human wastes. Point source and composition of milking center effluent are outlined. Milking center effluent routing options are discussed. Existing circumstances at the site must be the paramount consideration in selection of a waste handling option. (See also W74-10297) (Janssen-East Central)
W74-10301

LAGOON DISPOSAL OF DAIRY WASTES IN FLORIDA,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
R. A. Nordstedt, and L. B. Baldwin.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p. 359-370, 1973. 1 fig, 1 tab, 6 ref.

Descriptors: *Lagoons, *Farm wastes, *Waste disposal, *Waste storage, *Waste water treatment, *Dairy industry, *Florida, Climates, Soil types, Water pollution, Odor, Sludge.
Identifiers: Sand trap, Anaerobic lagoon, Storage pond, Dispersal field.

The dairy industry in Florida is characterized by large milking herds. The type of waste management systems used are influenced by the amount of labor and management input and by the climate and soils of Florida. The most common waste management system used is the lagoon system, consisting of a sand trap, anaerobic lagoon, detention pond, and dispersal field. The dimensions, volumes, efficiency and maintenance requirements of each of the four major components of the lagoon systems are discussed. The Florida Department of Pollution Control has set guidelines for the use of lagoons in Florida and lagoon construction has accelerated in the state. The lagoon system is successful in Florida due to climatic and soil conditions but may not be successful in other states. Potential ground water pollution must be carefully considered. (See also W74-10297) (Janssen-East Central)
W74-10302

PROGRESS REPORT--AEROBIC AND ANAEROBIC LAGOONING OF DAIRY AND MILKING WASTES,
Clemson Univ., S.C. Dept. of Agricultural Engineering.
C. L. Barth, H. P. Lynn, and W. L. Northern.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p. 371-380, 1973. 5 fig, 5 tab, 6 ref.

Descriptors: Lagoons, *Aerobic conditions, *Anaerobic conditions, Dairy industry, *Farm wastes, *Waste water treatment, Sludge, Algae.
Identifiers: *Dairy wastes, *Milking wastes, *Lagoon simulators, Volatile solids.

A progress report is presented on the lagooning of dairy wastes. One objective was to evaluate the feasibility of the no-discharge, anaerobic lagoon as a treatment facility for all dairy production wastes in a warm climate. Results of various research reports are compared to results obtained through use of six lagoon simulators. Among the results were these: (1) Highest percent reductions of volatile

solids were about 51% and 15% for the dairy manure wastes at the operating temperatures of 24.3 C and 11.5 C, respectively, (2) For the parlor wastes, maximum reduction percentages were about 63% and 16% at temperature levels of 24.6 C and 11.0 C. The increase of the higher over the lower operating temperature level approximates the rule of thumb that an increase of 10 C in temperature doubles the biological activity rate, (3) No apparent difference existed in the rate of sludge buildup from the manure waste at the two operating temperatures, (4) Using the range of .135 to .18 ft.3 of sludge per lb. of V.S. added and the figure of 7.9 lb. V.S./100 lb. cow/day would produce 390-520 ft.3 of sludge per year, (5) Each cow produced six gallons of parlor waste, thus producing .025 to .05 ft. of sludge per day of parlor wastes. (See also W74-10297) (Janssen-East Central)
W74-10303

IRRIGATION DISPOSAL OF MILKING CENTER WASTES,
Missouri Univ., Columbia. Dept. of Agricultural Engineering.
R. E. Phillips, M. R. Peterson, and R. M. George.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p. 381-388, 1973. 2 fig, 2 tab, 7 ref.

Descriptors: *Irrigation, *Waste water treatment, *Waste storage, *Waste disposal, *Farm wastes, *Dairy industry, *Lagoons, Aerobic conditions, Anaerobic conditions, Water pollution.
Identifiers: *Milking Center, *Soil plant filter, Volatile solids.

The use of irrigation systems to distribute milking center wastes to a soil-plant filter is an effective method of both waste disposal and pollution prevention. An anaerobic lagoon is recommended for collecting and storing milking center wastes. The type of irrigation system selected should be based on size operation, soil type, terrain encountered on the soil plant filter, available capital, and the manager's preference. The four types of surface irrigation suited to disposal of liquid wastes are: controlled flooding, furrow irrigation, border irrigation, and corrugation irrigation. (See also W74-10297) (Janssen-East Central)
W74-10304

SOLID MANURE HANDLING FOR DAIRY CATTLE,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
J. C. Converse, C. O. Cramer, T. J. Brevik, G. H. Tenpas, and D. A. Schlough.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 389-397, 1973. 5 fig, 5 ref.

Descriptors: *Dairy industry, *Cattle, *Solid wastes, *Liquid wastes, *Farm wastes, Operations research management, Waste storage.
Identifiers: Manure stacking, Bunker.

Solid manure research activities, management techniques, and storage problems are discussed. Two types of storage facilities are described. One is a bunker type storage structure for solids with a detention pond for liquids. The other system consists of two storage units serving 28 and 26 cows each. One is a pivoting elevator which is an extension of the barn cleaner while the other one is a thrower which places the manure in a windrow. The liquids flow into detention ponds. Several field type units using low cost limestone or shale bases are also being investigated. (See also W74-10297) (Janssen-East Central)
W74-10305

MANAGING BARNYARD RUNOFF FOR DAIRY CATTLE,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
J. D. Converse, C. O. Cramer, T. J. Brevik, C. B. Gilbertson, and G. H. Tenpas.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 398-403, 1973. 2 fig, 1 tab, 4 ref.

Descriptors: *Water storage, *Agricultural runoff, *Dairy industry, *Waste disposal, Cattle, Irrigation, Water pollution sources, *Wisconsin.
Identifiers: *Waste management.

Runoff control facilities, installed at two Wisconsin farms, are described and the chemical and physical characteristics of the runoff are given. The three requirements for control of runoff are separation of solids, storage of runoff liquids, and a disposal area. Each of these farms met these requirements in a similar manner, constructing a settling terrace, a settling basin, a porous dam, and a detention pond. Among conclusions and recommendations are the following: (1) Flow velocities in the terrace or basin should be less then 1 fps with detention times greater than 1 hour. (2) The slope of the settling terrace must be essentially level to avoid a build-up of solids near the porous dam. (3) Removal of solids from the settling terrace soon after accumulation is necessary to maintain storage capacity for the next storm. (4) In Wisconsin, the capacity of the detention pond should be equal to 8 to 10 inches of runoff from the watershed because of winter precipitation. (5) Detention ponds should be located in impermeable soil so as to eliminate ground water pollution. (6) Detention pond slopes should be 3:1 to 6:1 with an 8 foot wide top on the berm. Ponds should be fenced for safety.(7) Just before freeze up in late fall, the liquid level in the detention pond should be lowered to provide storage for winter and early spring runoff. (See also W 74-10297) (Janssen-East Central)
W74-10306

AGITATING, PUMPING, AND INJECTING LIQUID MANURE,
Starline, Inc., Harvard, Ill.
A. K. Gillette.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 404-408, 1973.

Descriptors: *Waste disposal, *Liquid wastes, *Farm wastes, *Pumping, Waste storage, Pumps, Centrifugal pumps.
Identifiers: *Agitation, *Soil injection, Plowing, Disking, Agitator pump, Chopper pump, Vacuum pump, Auger.

Manure collected and stored in pits or tanks usually must be agitated prior to emptying or pumping. This may be accomplished by use of an agitator pump, a 'chopper' pump, or a vacuum type tank spreader. Each of these methods usually transports the liquid manure into a tank spreader used for depositing the manure onto the land's surface. The use of centrifugal pumps and augers is discussed but not encouraged. Soil injectors may be attached to the tank spreader, discharging the liquid manure into furrows and covering them up. Plowing and disking are discussed as means for obtaining similar results. Soil injection best achieves elimination of odor and runoff pollution. 'Plow-down' rates next and disking rates last. All these methods are better than surface spreading for prevention of runoff and for odor control. (See also W74-10297) (Janssen-East Central)
W74-10307

MIXING AND HANDLING OF LIQUID DAIRY CATTLE MANURE,
Guelph Univ., (Ontario). School of Engineering.
J. Pos, and H. E. Bellman.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 409-418, 1973. 1 tab.

Descriptors: *Dairy industry, *Farm wastes, *Waste storage, *Aerobic treatment, *Liquid wastes, Nitrogen, Chemical oxygen demand, Biochemical oxygen demand, Mixing, Handling, Slurries, Odor, *Canada, *Waste water treatment.
Identifiers: Manure pumps, Agitation, Total solids, *Ontario(Canada).

A largely unsuccessful attempt was made in Ontario to evaluate several methods of agitating large quantities of liquid dairy manure and to investigate several possibilities of aerobic treatment to control odors in storage. The basic plan was to use 4 pipelines to each of 2 storage tanks; 3 for pumping manure into the bottom of each tank and a return line to the sump. Stones and wood shavings got into the system creating blockage problems. Another time, a four inch plastic pipe burst emptying the liquid manure into the barn and into a highway ditch. During the winter the agitator pump froze. Data recorded December, 1972 - January, 1973 revealed daily production of diluted manure for 104 dairy cows was 225 cu ft of manure slurry and 108 cu ft wash water from the milk room and milking parlour. Eventually the amount of washwater was reduced, but the total diluted manure production of 3.19 cu ft per cow still exceeded the design specifications of 2 cu ft per cow. Analyses during this time for NH4, Org. N, Total N, BOD, and COD were made. In January of 1973, the tank had 20,474 cu ft of manure with a 4-inch thickness of frozen manure on the surface. On the basis of total solids and content, it appeared that a reasonable mix of suspended solids below the frozen crust was obtained after 30 minutes of mixing. Further observations and analyses are continuing. (See also W74-10297) (Janssen-East Central)
W74-10308

FLUSHING SYSTEMS FOR FREE-STALL DAIRY BARNS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
R. K. White, and R. M. Porter.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 419-428, 1973. 7 fig, 3 tab.

Descriptors: *Farm wastes, *Dairy industry, Automation, Chemical oxygen demand, Biochemical oxygen demand, *Ohio, *Waste water treatment.
Identifiers: *Flushing systems, Free-stall dairy barns, Total solids, Volatile solids.

A new dairy science center was installed at the Ohio State University with a flushing system for manure handling. A description of the facility is given. Two nine hundred gallon tanks with vertical sluice gates were used to discharge the flushing water. Peanut hulls were substituted for straw as bedding to allow the manure slurry to be discharged into the Columbus sewer system. Characteristics of the manure slurry, estimated daily water use, and manure output are tabulated. The flusing system will allow automation of a dairy facility and will reduce labor costs. (See also W74-10297) (Janssen-East Central)
W74-10309

LIQUID COMPOSTING OF DAIRY COW WASTE,
De Laval Separator Co., Poughkeepsie, N.Y.
B. Hoffman, and L. S. Crauer.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 429-440, 1973. 4 fig.

Descriptors: *Farm wastes, *Dairy industry, *Cattle, *Waste disposal, *Waste treatment,

*Waste water treatment, Water pollution, Aerobic bacteria, Thermophilic, Ammonia, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: *Composting, *Licom System.

Surface water and groundwater can be contaminated by manure through runoff and infiltration. A liquid composting system (Licom), deodorizes, pasteurizes, and biologically decomposes dairy cattle wastes with the use of digestion tanks and bacteria. Several modes of Licom System operation are available. Effluent from Licom I is completely stabilized and pasteurized and can be stored for long periods before returning it to the land. The Licom II is a continuous system and operates more efficiently than Licom I. Licom III is also a continuous system and offers a method of separating the liquid and solid waste for discharge of the liquid into surface waters. The Licom III method efficiently met the New York State standards for effluent released into surface waters. The dry residue from Licom III may be used as a soil conditioner or as bedding in the barn. (See also W74-10297) (Janssen-East Central)
W74-10310

SOLID COMPOSTING OF DAIRY MANURE,
Agricultural Research Service, College Park, Md.
G. B. Willson, and J. W. Hummel.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 441-459, 1973. 12 fig, 2 tab. 9 ref.

Descriptors: *Dairy industry, *Farm wastes, Aeration, Moisture, Chemical oxygen demand, Aerobic bacteria, Nitrates, Ammonia, Permeability, Thermophilic bacteria, *Waste water treatment.
Identifiers: *Composting.

Studies were undertaken to develop design criteria for composting operations. Aeration data were obtained from tests in small bench composters, and in one-half ton capacity bins. These data were substantiated by the composting of dairy manure in a mechanized channel. It was determined that ideally the aeration rate would be varied during the process in the following sequence: 1. During the warmup stage of the process, aeration would be applied at increasing rates in the low part of the temperature limiting range. 2. When thermophilic temperature is reached the aeration rate would be increased to the top of the temperature limiting range. If some drying is desirable, a higher aeration rate would be selected. 3. As the level of activity decreases the rate of aeration would be reduced to prevent cooling. This operating procedure will keep temperatures up until desired degree of decomposition is reached. (See also W74-10297) (Janssen-East Central)
W74-10311

WASTE MANAGEMENT REGULATIONS AND PROPOSALS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
W. C. LaVeille.
In: Conference Papers, National Dairy Housing Conference, Michigan State University, East Lansing, February 6-8, 1973, p 460-469, 1973.

Descriptors: *Federal Water Pollution Control Act, *Farm wastes, *Feed lots, *Regulation, *Legal aspects, Environmental control, Water pollution sources, Permits, Cattle, Hogs, Poultry, *Water quality standards.
Identifiers: *Waste management.

The establishment, organization, and activities of the Environmental Protection Agency are discussed. The history of federal water pollution control is traced from the 1886 River and Harbor Act to the Federal Water Pollution Control Act of 1972. It is felt that this new law will bring a profound and far-reaching change to the system of pollution control because it (1) establishes effluent limitations, (2) establishes higher standards of pollution control, (3) creates a national permit program and (4) establishes tough penalties to enforce compliance. The most immediate concern of those involved in agricultural production activities is how the permit program will affect them. Proposed rulemaking excludes discharges from agricultural and silvicultural activities from NPDES (National Pollutant Discharge Elimination System) requirements with the exception of large feedlots, certain types of hatcheries and fish farms, and return flow from some medium- and large-sized irrigation systems. Although owners and operators of the excluded point sources are not required to obtain an NPDES permit, they must comply with the other requirements of the Act, including any applicable effluent guidelines; standards of performance; toxic effluent standards or prohibitions; or pretreatment standards. (See also W74-10297) (Janssen-East Central)
W74-10312

ANNUAL LITERATURE REVIEW: ADMINISTRATION, SYSTEMS ANALYSIS,
Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 6A.
W74-10322

WATER PURIFICATION - USING ELECTROLYSIS TO RELEASE OXYGEN,
S. H. McMenamin.
French Patent 7,107,184. Issued September 25, 1973. French Patent Abstracts, January 31, 1974.

Descriptors: *Patents, *Water treatment, *Disinfection, *Waste water treatment, *Electrolysis, Water purification, Oxygen.
Identifiers: Reduction, *Electrolytic purification.

A reduction process for the electrolytic purification of water is described. A sufficient amount of electrolyte is added to the water to make it conductive, and the water passes a pair of electrodes. A direct current releases a predetermined volume of oxygen at the cathode to injure microorganisms in the water. (Merritt-FIRL)
W74-10347

FILTER - FOR CLARIFYING NATURAL AND WASTE WATERS,
Leningrad Communal Agriculture Academy Research Inst. (USSR).
E. G. Petrov, Z. Ya. Gorodisher, and M. G. Novikov.
Soviet Patent 376,104. Issued July 6, 1973. Soviet Inventions Illustrated, January 24, 1974.

Descriptors: Effluents, Water treatment, *Filtration, Equipment, *Patents, *Waste water treatment, *Filters.
Identifiers: *Clarification.

A filter for clarifying natural and waste waters is described which includes a body with a filtering charge, system of entry and exit, and vibrators. The degree to which the filter medium can clean the waters is increased and consumption of wash water is reduced by establishing vibrators directly in the first layers of the filter medium commensurate with the direction of liquid flow. Water comes in through the distribution system and is fed to the charge of filter material. The clean water runs through the collector and pipe. As wash water is admitted through the system, the vibrators are switched on, thus helping to dislodge the entrapped impurities. The wash water flow is directed upwards through the entire thickness of the bed, taking the impurities with it. The rate of feed is 4-5 liters/sec/square meter. (Merritt-FIRL)
W74-10348

FULL-SCALE TESTING OF A WATER RECLAMATION SYSTEM,
Central Contra Costa Sanitary District, Walnut Creek, Calif.
G. A. Horstkotte, D. G. Niles, D. S. Parker, and D. H. Caldwell.
Journal Water Pollution Control Federation, Vol 46, No 1, p 181-197, January 1974. 3 fig, 10 tab, 17 ref.

Descriptors: Water treatment, *Pilot plants, *Coagulation, *Sedimentation, *Nitrification, *Denitrification, Effluents, Municipal wastes, *Waste water treatment, Tertiary treatment, Treatment facilities.

The full scale testing of a 300 mgd water reclamation system that will produce water for industries located along the southern shore of Suisun Bay, California, is described. Treatment in the planned plant will consist of lime coagulation-sedimentation, nitrification, and denitrification. Performance data for a representative three months of operation were tabulated and indicate that the performance of the Advanced Treatment Test Facility (ATTF) is stable. The concentration of organics in the nitrified and denitrified effluents is low, as measured by BOD and organic carbon. Operation for complete nitrification also results in high organic removals. Suspended matter concentrations in the nitrified and denitrified effluents are also exceptionally low. This is attributed in part to the fact that the sludge has tended to be in a bulking condition, and effluents from bulking sludges are quite commonly very clear. Total nitrogen in the denitrified effluent averages less than 2 milligrams/liter. More than half of the effluent nitrogen is organic nitrogen, much of which will be removed by effluent filtration. Total phosphorus is below the one milligram/liter limit. Based on the three months of performance, it is concluded that the system can dependably produce the quality of effluent required. (Merritt-FIRL)
W74-10349

DISINFECTION PRACTICES IN THE SAN FRANCISCO BAY AREA,
Wallace and Tiernan, Inc., San Francisco, Calif.
G. C. White.
Journal Water Pollution Control Federation, Vol 46, No 1, p 89-101, January 1974. 7 fig, 1 tab, 11 ref.

Descriptors: *Disinfection, *Water treatment, *California, Treatment facilities, Domestic water, Activated sludge, Filtration, Oxidation, Chlorine, Recirculated water, Municipal wastes, *Waste water treatment, Mixing, Bays.
Identifiers: *San Francisco Bay area.

The disinfection of wastewater in the San Francisco Bay area, based on an investigation of 36 treatment plants over a six month period in 1972 is discussed. The data collected included: type of treatment process, characteristics of influent wastewater, chlorine dosage, chlorine consumption, chlorine residual, biochemical oxygen demand of influent and effluent, suspended solids in the effluent, contact time, contact chamber configuration, most probable number (MPN) of coliform in effluent, dye studies of contact chambers, pH, ammonia nitrogen, mixing at point of application, type of chlorine control system, monitoring if any, reliability of operation, and method of measuring chlorine residual. The data are organized in groups characterized by the basic treatment process: 11 primary, 15 activated sludge, four secondary using high rate recirculating filters, four secondary followed by oxidation ponds, one tertiary, and one consisting of oxidation ponds only. Mixing was of major importance to good disinfection performance. The optimum dosage of chlorine for disinfection of domestic wastewater is between 10 and 15 milligrams/liter. The optimum residual with adequate mixing such as in a hydraulic jump seems to be between 3-4 milligrams/liter with not less than 30 minutes contact time. (Merritt-FIRL)

W74-10350

5E. Ultimate Disposal Of Wastes

SUMMARY EVALUATION OF CANDIDATE FLUID-BED SOLIDIFICATION PROCESSES FOR USE IN THE NWCF,
Allied Chemical Corp., Idaho Falls, Idaho. Idaho Chemical Programs Operations Office.
For primary bibliographic entry see Field 5D.
W74-09829

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Division of Waste Management and Transportation (AEC), Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-09839

ICE MELTING EXPERIMENTS--A MODEL STUDY FOR BURIAL OF RADIOACTIVE WASTES,
Sandia Lab., Albuquerque, N.Mex.
For primary bibliographic entry see Field 5D.
W74-09868

SAVANNAH RIVER LABORATORY PROGRESS REPORT-LONG-RANGE WASTE MANAGEMENT.
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
Available from NTIS, Springfield, Va., as Rept. No. DPST-72-125-6; $4.00/copy, $1.45/microfiche. Report No DPST-72-125-6, September 1972. 11 p, 4 fig.

Descriptors: *Radioactive waste disposal, *Research and development, *Waste storage, Geology, Hydrology, *Safety, Evaluation, Rocks, Soils, Stratigraphy, Bedrock, Hydrogeology, On-site investigations, Sediments, Faults(Geologic), Mesozoic era.
Identifiers: Bedrock storage, Triassic formation.

The exploratory and development program for the bedrock storage of wastes is being deferred indefinitely by the AEC. Two segments of this program will be continued to conclusion by January: (1) exploration of the Triassic formation beneath the plantsite, and (2) technical reassessment of the bedrock storage concept. The Triassic exploratory program was designed to develop knowledge of this region equivalent to knowledge of the crystalline bedrock. About four wells were anticipated; the two or three wells to define the limits of the basin were not started and will be deferred; the wells that are being drilled to investigate the hydrology of a fault within the basin will be completed to the extent needed to explore the fault, and the drilling data will be accumulated, analyzed, and documented. Technical reassessment of the concept of storage of wastes in bedrock beneath the plantsite on the basis of the information that has been obtained will be made. (Houser-ORNL)
W74-09881

THERMAL DISCHARGES--PROBLEMS AND OPPORTUNITIES,
Division of Biology and Medicine (AEC), Washington, D. C.
For primary bibliographic entry see Field 5D.
W74-09888

GROUND WATER POLLUTION FROM SUBSURFACE EXCAVATIONS: PART IV. MORE ON POLLUTION FROM WELLS.
For primary bibliographic entry see Field 5B.
W74-09929

RULES PERTAINING TO STANDARDS FOR SUBSURFACE SEWAGE AND NON-WATER-CARRIED WASTE DISPOSAL.
Oregon State Dept. of Environmental Quality, Portland.
January 1974. 106 p, 12 append.

Descriptors: *Oregon, *Sewage disposal, *Sewage, *Waste disposal, *Waste treatment, *Septic tanks, Wastes, Municipal wastes, Sanitary engineering, Sewage districts, Sewage effluents, Sewage treatment, Sewage lagoons, Water pollution, Water pollution sources, Cesspools, Disposal, Domestic wastes, Farm wastes, Soil disposal fields, Regulation.
Identifiers: *Administrative regulations.

Rules prescribe the requirements for the construction, operation and maintenance of subsurface sewage disposal systems and nonwater-carried waste disposal facilities, and establish procedures for regulation of such activities. The purpose is the restoration and maintenance of the quality of the public waters and the protection of the public health and welfare. The rules provide for the issuance of permits where proposed constructions are in accordance with the rules of the Environmental Quality Commission. The rules require standards for the installation of a subsurface sewage disposal system, designed to prevent degradation of the quality of any public waters in the state, or creation of a health hazard. Requirements of size, liquid capacity and installation of septic tanks are also prescribed. Detailed minimum requirements for disposal areas and distribution techniques are listed. Nonwater-carried waste disposal facilities also require a permit and requirements for their construction are prescribed. Under the rules, licenses are required for sewage disposal services, and equipment operation must comply with listed rules. (Craig-Florida)
W74-09993

FACTORS IN REGIONAL ASSESSMENT OF WASTEWATER REUSE,
Camp, Dresser and McKee, Boston, Mass.
For primary bibliographic entry see Field 5D.
W74-10016

SANITARY LANDFILL,
Army Construction Engineering Research Lab., Champaign, Ill.
D. L. Nelson.
Available from National Technical Information Service as AD-773 714, $3.25 in paper copy, $1.45 in microfiche. Final Report January 1974. 5 fig, 5 tab, 9 ref.

Descriptors: *Reviews, *Landfills, *Sanitation, *Design criteria, Engineering structures, Hydrology, Geology, Climatology, Costs, Mathematical costs.
Identifiers: *Sanitary landfills.

A literature review details the operation and design of sanitary landfills. Operational parameters reviewed include basic methods of operation, compaction procedures and expected in-place refuse densities, cover requirements, and site improvements. The engineering design consideration were: refuse decomposition (including production and control of leachate and gas); the use of information on hydrology, geology, climatology, and waste characteristics to evaluate and classify sanitary landfill sites; possible uses for a completed landfill site; and equipment cost data. Mathematical analyses defined optimum cell shape and minimum cover conditions in terms of landfill parameters. (Prague-FIRL)
W74-10018

SAVING A DYING SEA. THE LONDON CONVENTION ON OCEAN DUMPING,
For primary bibliographic entry see Field 6E.
W74-10065

TRANSPORTATION FOR DUMPING AND DUMPING OF MATERIAL INTO OCEAN WATERS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10070

WELLBORE EFFECTS IN INJECTION WELL TESTING,
Marathon Oil Co., Denver, Colo.
For primary bibliographic entry see Field 8G.
W74-10091

SAVANNAH RIVER LABORATORY, WASTE MANAGEMENT QUARTERLY REPORT, JANUARY-MARCH 1973.
Du Pont de Nemours (E.I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 5D.
W74-10116

RADIOACTIVE SOLID WASTE DISPOSAL INTO THE OCEANS: IMPLICATIONS AND PERSPECTIVES,
Comitato Nazionale per l'Energia Nucleare, Rome (Italy).
C. Polvani.
Available from NTIS, Springfield, Va., as Rept. No. RT/PROT-70-34; $4.00/copy, $1.45/microfiche. Presented at Symposium on the International Regime of the Sea-Bed; Rome, Italy, June 30, 1969. Report No. RT/PROT-(70)-34, 1969. 20 p, 25 ref.

Descriptors: Radioactive waste disposal, Solids, Waste treatment, Nuclear wastes, Oceans, Continental shelf, Basins, Concretes, Water pollution, Regulation, Food chains, Public health, Research and development.
Identifiers: Containment, Deep basins.

The sea bottom has been considered as a possible site for the disposal of solid materials having low, or sometimes intermediate, activity. Sea dumping, however, is a final act and should be used only for materials for which no future is foreseeable. Furthermore, if the sea dumping has been carried on under conditions or to an extent that later appear to have been ill-advised or dangerous, there is no practical way of correcting the situation. These considerations obviously lead to limitations of the possibility of dumping solid wastes into the sea. First of all, not all solid wastes can be taken into consideration for such a solution. There has never been any suggestion of using the sea for the really high level wastes, such as those arising directly from the chemical processing of spent nuclear fuel. Additional limitations are specifications of containment material and the area of the sea in which to dump. The continental shelf and deep basins are discussed as possible dump sites. (Houser-ORNL)
W74-10117

OVERVIEW OF HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT STUDIES.
Battelle-Pacific Northwest Lab., Richland, Wash. Nuclear Waste Technology Dept.
For primary bibliographic entry see Field 5D.
W74-10124

BRICKS ARE BEING FORMED FROM MANURE AND GLASS.
Hoard's Dairyman, Vol 119, No 1, p 35, January 10, 1974.

Descriptors: *Farm wastes, *Cattle, *Recycling, *Waste disposal, Dairy industry, *Construction materials.
Identifiers: *Glass, *Bricks.

Dr. John D. Mackenzie, Los Angeles engineering professor, has perhaps found an answer to the problem of animal waste disposal. He has perfected building products, such as bricks, tiles, wall core materials, and garden stones, from a mixture of dried cow manure and broken glass bottles blended together in a pressure cooker. The building products are stronger and lighter than any now on the market. They are fireproof, odorless, noise and heat insulators, and can be drilled, sawed, painted and glued easily. This inexpensive process answers two problems: (1) environmental concerns on the farm, and (2) badly needed construction materials. It also utilizes the untold amounts of disposable glass containers. The University of California has applied for patents covering the main process. (Cameron-East Central)
W74-10129

NO ODOR AND NO POLLUTION,
Soil Conservation Service, Hondo, Tex.
For primary bibliographic entry see Field 5D.
W74-10132

CONCENTRATION OF PROTEINACEOUS SOLIDS FROM AERATED SWINE MANURE,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10140

A ROTATING FLIGHTED CYLINDER TO SEPARATE MANURE SOLIDS FROM WATER,
Dept. of Agricultural Engineering. Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 5D.
W74-10145

SYMPOSIUM: PROCESSING AGRICULTURAL AND MUNICIPAL WASTES.
For primary bibliographic entry see Field 5D.
W74-10149

THE CHALLENGE OF WASTE UTILIZATION,
For primary bibliographic entry see Field 5D.
W74-10150

PROCESSING ANIMAL WASTES FOR FEED AND INDUSTRIAL PRODUCTS,
For primary bibliographic entry see Field 5D.
W74-10152

FUEL FROM AGRICULTURAL WASTES,
For primary bibliographic entry see Field 5D.
W74-10157

INTERNATIONAL SYMPOSIUM ON WASTEWATER TREATMENT IN COLD CLIMATES.
Environmental Protection Service, Ottawa (Ontario).
For primary bibliographic entry see Field 5D.
W74-10160

AN EVALUATION OF WASTE DISPOSAL PRACTICES IN ALASKA VILLAGES,
Alaska State Dept. of Environmental Conservation, Fairbanks.
For primary bibliographic entry see Field 5D.
W74-10161

PROBLEMS OF THE CANADIAN NORTH,
Environmental Protection Service, Ottawa (Ontario). Water Pollution Control Directorate.
For primary bibliographic entry see Field 5D.
W74-10165

RENOVATION OF SECONDARY EFFLUENT FOR REUSE AS A WATER RESOURCE,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
For primary bibliographic entry see Field 5D.
W74-10197

DEMONSTRATION OF THREE RECIRCULATING SWINE WASTE MANAGEMENT SYSTEMS,
Iowa State Univ., Ames. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10198

SOIL MOTTLING AND DRAINAGE IN A MOLLIC HAPLUDALF AS RELATED TO SUITABILITY FOR SEPTIC TANK CONSTRUCTION,
Wisconsin Univ., Madison. Coll. of Agricultural and Life Sciences.
For primary bibliographic entry see Field 5B.
W74-10212

BUREAU OF MINES ENVIRONMENTAL ACTION PROGRAMS FOR NORTHEASTERN PENNSYLVANIA--REFUSE BANK REMOVAL; SUBSIDENCE MONITORING,
MITRE Corp., McLean, Va.
For primary bibliographic entry see Field 5A.
W74-10270

DEPOLLUTION TECHNIQUES AND MANAGEMENT IN AN OIL REFINERY,
Indian Inst. of Petroleum, Dehra Dun.
For primary bibliographic entry see Field 5D.
W74-10280

WATER DESALTING,
J. S. Johnson, K. A. Kraus, and A. E. Martsinkovskii.
Soviet Patent 381195. Issued March, 1974. Soviet Inventions Illustrated, Vol 5, No 8, p 1, March, 1974.

Descriptors: *Filtration, *Patents, *Desalination, *Membrane processes, Membranes, Porous media, Ion exchange, Metals, Salts, Organic matter, Solutions, Solubility, Suspensions, Pressure.
Identifiers: Inorganic materials, Multi-valent metal salts, U.S.S.R.

High pressure filtration through a porous membrane accomplishes water desalting after the addition of surfactants. These include neutral organic polymers, polyelectrolytes, organic and inorganic ion-exchangers, and multi-valent metal salts, which may be added as solutions, suspensions, or emulsions. The method proposed may be used for sea, industrial, and radioactive water. Water is passed at pressure 1000 psi through a porous membrane such as a metal filter, charcoal, or cellophane. The additives form a film on the membrane which repulses soluble materials. (Prague-FIRL)
W74-10284

CONFERENCE PAPERS, NATIONAL DAIRY HOUSING CONFERENCE.
For primary bibliographic entry see Field 5D.
W74-10297

LAGOON DISPOSAL OF DAIRY WASTES IN FLORIDA,
Florida Univ., Gainesville. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10302

IRRIGATION DISPOSAL OF MILKING CENTER WASTES,
Missouri Univ., Columbia. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10304

MANAGING BARNYARD RUNOFF FOR DAIRY CATTLE,
Wisconsin Univ., Madison. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10306

AGITATING, PUMPING, AND INJECTING LIQUID MANURE,
Starline, Inc., Harvard, Ill.
For primary bibliographic entry see Field 5D.
W74-10307

FLUSHING SYSTEMS FOR FREE-STALL DAIRY BARNS,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10309

5F. Water Treatment and Quality Alteration

HIGH RATE FILTRATION MEDIA CONCEPTS,
Taulman Co., Atlanta, Ga. Turbitrol High Rate Filter Div.
E. F. Morey.
Public Works, Vol 105, No 5, p 80-83, May 1974. 3 fig,

Descriptors: *Filtration, *Water treatment, *Filters, *Sand, Silica, Design criteria, Pilot plants, Experimentation, Costs, Installation.
Identifiers: Filter bed, Dual filters, Uniform dual filters, Mixed media filters, One inch cap filters.

High rate filtration has become a viable alternative to conventional silica sand media filters. Five types of filter media are: silica sand only, where grain size is distributed from fine to coarse from top to bottom; the so-called 'ideal filter' with grain size gradually decreasing throughout bed depth; the conventional dual-media filter incoporating an anthracite coal layer on top of silica sand; the mixed or tri-media concept, utilizing a combination of anthracite, silica sand and garnet or ilmenite; and the uniform dual-media filter comprised of highly uniform anthracite and silica layers. The last three are approaches to the so-called ideal filter bed design. Three plants throughout the country were compared using dual, uniform dual, mixed media, and one inch caps (a slightly modified conventional sand filter. Based upon their data, uniform dual-media and mixed media filters exhibited better performance than conventional dual media filters. The efficiency increase from significantly longer filter runs will offset costs of installation. (Prague-FIRL)
W74-10014

HIGH-RATE FILTRATION,
CH2M/Hill, Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W74-10015

FACTORS IN REGIONAL ASSESSMENT OF WASTEWATER REUSE,
Camp, Dresser and McKee, Boston, Mass.
For primary bibliographic entry see Field 5D.
W74-10016

SELECTING MIXERS FOR TREATMENT OPERATIONS,
Philadelphia Mixers Corp., Pa.

For primary bibliographic entry see Field 5D.
W74-10017

SLUDGE BLANKET FOR WATER TREATMENT.
Standard Telephones and Cables Pty. Ltd., Alexandria (Australia).
For primary bibliographic entry see Field 5D.
W74-10020

DESIGN AND PERFORMANCE OF CHLORINE CONTACT TANKS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 5D.
W74-10035

POTABLE WATER--QUALITY GOALS,
For primary bibliographic entry see Field 5G.
W74-10059

AN OVERVIEW OF THE PROBLEMS OF DISINFECTION,
National Environmental Research Center, Cincinnati, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5D.
W74-10181

CHLORINE DISINFECTION OF WASTEWATER,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
For primary bibliographic entry see Field 5D.
W74-10182

LIME DISINFECTION OF SEWAGE BACTERIA AT LOW TEMPERATURE,
Colorado State Univ., Fort Collins. Dept. of Microbiology.
For primary bibliographic entry see Field 5D.
W74-10183

OZONE DISINFECTION OF WASTEWATERS AT LOW TEMPERATURES,
Cincinnati Univ., Ohio. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W74-10184

ALASKA VILLAGE DEMONSTRATION PROJECTS: FIRST GENERATION OF INTEGRATED UTILITIES FOR REMOTE COMMUNITIES,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
For primary bibliographic entry see Field 5D.
W74-10186

A STUDY OF BDELLOVIBRIO BACTERIOVORUS AS A BIOLOGIC FACTOR OF SELF PURIFICATION OF WATER BODIES, (IN RUSSIAN),
For primary bibliographic entry see Field 5C.
W74-10204

A STUDY OF INCINERATOR RESIDUE ANALYSIS OF WATER SOLUBLE COMPONENTS,
Drexel Univ., Philadelphia, Pa. Environmental Engineering Program.
For primary bibliographic entry see Field 5B.
W74-10269

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA (LOS PROGRAMAS DE ABASTECIMIENTO RURAL DE AQUA DE AMERICA LATINA),
For primary bibliographic entry see Field 6E.
W74-10279

DISINFECTION PRACTICES IN THE SAN FRANCISCO BAY AREA,
Wallace and Tiernan, Inc., San Francisco, Calif.
For primary bibliographic entry see Field 5D.
W74-10350

5G. Water Quality Control

INSTITUTIONAL FACTORS IN THE CREATION OF LOCAL SANITARY DISTRICTS IN WISCONSIN,
Wisconsin Univ., Madison. Land Tenure Center.
For primary bibliographic entry see Field 5D.
W74-09811

A BIBLIOGRAPHY OF THE ZOOLOGY OF TENNESSEE AND THE TENNESSEE VALLEY REGION,
Office of Information Services (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 2I.
W74-09826

THE REGULATION OF THE ENVIRONMENTAL EFFECTS OF NUCLEAR POWER PLANTS,
Consolidated Edison Co. of New York, Inc., New York.
For primary bibliographic entry see Field 5C.
W74-09866

MANAGEMENT OF SOLID RADIOACTIVE WASTES,
Atomic Energy Commission, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-09874

STATISTICAL TESTS OF LEOPOLD'S SYSTEM FOR QUANTIFYING AESTHETIC FACTORS AMONG RIVERS,
Calgary Univ. (Alberta). Dept. of Geography.
For primary bibliographic entry see Field 6G.
W74-09913

SOME ASPECTS OF AQUATIC INSECT POPULATIONS OF POOLS AND RIFFLES IN GRAVEL BED STREAMS IN WESTERN UNITED STATES,
Geological Survey, Doraville, Ga.
For primary bibliographic entry see Field 2E.
W74-09919

ECOLOGICAL MANAGEMENT OF THERMAL DISCHARGES,
California Univ., Berkeley. Dept. of Sanitary Engineering and Public Health.
For primary bibliographic entry see Field 5D.
W74-09923

DRAINAGE AND EROSION CONTROL FACILITIES, FIELD PERFORMANCE INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 8A.
W74-09948

ENVIRONMENTAL PROTECTION AND ADMINISTRATIVE CHANGE IN STATE WATER MANAGEMENT IN THE PACIFIC COAST STATES,
California Univ., Davis. Dept. of Political Science; and California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 6E.
W74-09951

LONG ISLAND WATER,
For primary bibliographic entry see Field 2F.
W74-09961

EXECUTIVE ORDER NO. 11735: ASSIGNMENT OF FUNCTIONS UNDER SECTION 311 OF THE FEDERAL WATER POLLUTION CONTROL ACT.
For primary bibliographic entry see Field 6E.
W74-09975

COASTAL WETLANDS PROTECTION LAW.
For primary bibliographic entry see Field 6E.
W74-09981

POWER PLANTS AND COTTONTAILS,
Cornell Univ., Ithaca, N.Y.
B. Wallace.
Saturday Review of the Sciences, Vol 1, p 34-35, May, 1973. 1 photo.

Descriptors: *Electric power industry, *Cost-benefit analysis, *Decision making, *Project planning, Economics, Indirect costs, Thermal pollution, Waste water Water pollution sources, Radioactivity, Analytical techniques, Social aspects, Aesthetics, Direct benefits, Direct costs, Water pollution effects, Environmental sanitation, Water conservation, Radioactive waste, Government finance, Electric power demand, Nuclear powerplants.
Identifiers: *National Environmental Policy Act(NEPA), *Environmental impact statement(EIS).

The impact of a three-thousand megawatt nuclear power station on the environment is discussed. The benefits derived from the construction of the plant included more tax money, more jobs and more power. However, there were also costs involved. The plant would encompass one-hundred and forty-five acres. There would be a seven per cent increase in radiation exposure, and seven hundred pounds of salt would be dumped into Lake Ontario daily. Concern is expressed that perhaps the costs are not adequately listed. The effects of three-thousand megawatts, one-tenth the energy consumed in 1940 America, could hardly be confined to under one-hundred and fifty acres. To be of use in arriving at rational decisions, an environmental impact study, even though prepared for a single power plant, cannot pretend its subject exists in a vacuum. By being constrained to an analysis of individual stations, one by one, none of the study groups will notice when the heat, salt, radioactive wastes, and the cascading ramifications of energy production have merged. (Sperling-Florida)
W74-09982

INVERSE CONDEMNATION--STREAM POLLUTION AS TAKING OF PROPERTY FOR PUBLIC USE.
Tennessee Law Review Vol 40, p 514-520, Spring 1973. 36 ref.

Descriptors: *Streams, *Legislation, *Sewage, *Value, Water pollution, Public use, Eminent domain, Pollution, Legal aspects, Riparian rights, Waste disposal, Waste water(Pollution), Pollutants, Water pollution effects, Water quality, Public rights, Pollution abatement, Water pollution control.
Identifiers: *Inverse condemnation.

Inverse condemnation describes a cause of action designed to recover the value of property taken by a government defendant even though no exercise of its power of eminent domain has been attempted. Dumping municipal sewage into a private stream results in a serious impairment of riparian rights and actions may be brought on theories of nuisance, negligence or statutory remedies. However, it is unclear whether the resulting injury to

the riparian owner constitutes a taking, which can result in an inverse condemnation action. The majority of jurisdictions follow the principle that the pollution of a stream by sewage or for any other public purpose is a taking of property in the constitutional sense, and it cannot be effected without compensation. Such actions present the problem of determining at what point in time the taking occurred, so as to calculate damages. With the continuing erosion of governmental immunity such actions may be outmoded, but the need exists for such an action, especially by those landowners who can show actual damages. (Sutton-Florida)
W74-09983

POLLUTION CONTROL: PRELIMINARY MANDATORY INJUNCTION TO PREVENT, CORRECT OR REDUCE EFFECTS OF POLLUTING PRACTICES,
For primary bibliographic entry see Field 6E.
W74-09986

JELLYFISH CONTROL.
Committee on Merchant Marine and Fisheries (U.S. House).
For primary bibliographic entry see Field 6E.
W74-09989

APPLICATION OF FEDERAL WATER POLLUTION CONTROL ACT REQUIRING NOTICE TO FEDERAL AGENCY OF PROHIBITED DISCHARGE FROM A VESSEL OR FACILITY,
For primary bibliographic entry see Field 6E.
W74-09991

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT BY PROVIDING FOR THE REGULATION OF DUMPING IN UNITED STATES WATERS.
For primary bibliographic entry see Field 6E.
W74-09992

POLICY FOR LOCATION OF OFFSHORE PORTS AND OIL REFINERIES IN COASTAL AREAS,
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Industrial Tourist and Community Resources.
R. E. Leak, W. S. Gaither, L. S. St Amant, and W. D. Welch.
Report of the Governor's Conference on Marine Resources, p 35-42, December 17-18, 1973.

Descriptors: *Offshore platforms, *Oil pollution, *Coastal structures, *Water pollution sources, *Harbors, Port authorities, Oil, Oil industry, Oil spills, Environmental effects, Oily water, Coasts, Ships, Water pollution, Oil wastes, Social aspects, Pipelines, Sites.

Three views on a policy for location of offshore ports and oil refineries in coastal areas are presented: the port designer's viewpoint, the industrial developer's viewpoint, and the environmentalist's viewpoint. The industrial developer suggested the establishment of environmental and socio-economic parameters in the siting of offshore ports which are related to onshore capacity to support refinery operations. The ability of an area to support refinery operations must be well developed before a decision to construct an offshore port is made. He concluded that refineries should be located away from congested areas, with the southeast coastal areas as prime locations for offshore port development. The port designer reached similar conclusions, although he felt offshore ports should be constucted close to existing refineries. The environmentalist concluded that deepwater and shore facilities can be constructed with little damage to the environment. He feels refineries can be placed anywhere and there is great flexibility in use of pipelines. (Craig-Florida)
W74-09995

THE 1972 CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AT SEA,
R. N. Duncan.
Journal of Maritime Law and Commerce, Vol 5, No 2, p 299-315, January 1974. 24 ref, append.

Descriptors: *Permits, *Treaties, *International law, *Oceans, *Waste disposal, *Water pollution sources, Regulation, United Nations, Water law, Legal aspects, Environmental sanitation, Water conservation, Oily wastes, Radioactive wastes, Industrial wastes, Pesticide residues, Inorganic compounds, Heavy metals, Navigation, Fishing, Standards, Water pollution effects, Toxicity.
Identifiers: Navigation obstructions, Hazardous substances(Pollution), Mercury pollution.

In 1972 eighty countries signed the Convention on the Prevention of Marine Pollution. The convention is the result of a United Nations Conference and it imposed a three-tier system toward the dumping of waste at sea. The dumping of certain wastes will be prohibited and the dumping of other wastes will require a special permit. A general permit will be required to dump all other substances. Wastes on the prohibited list include mercury, plastics, oils, radioactive wastes, and materials produced for biological or chemical warfare. Wastes which require a prior special permit include arsenic, zinc, lead, copper, cyanides, fluorides, and pesticides. Prior special permits are also required for the dumping of containers, scrap metal, and other bulky wastes which could pose a hazard to fishing and navigation. Before a prior general permit can be issued certain criteria must be satisfied. These relate to quantity, composition, form, toxicity, persistence, accumulative effects, and the possibility of the tainting of fish, as well as the characteristics of the dumping site. (Sperling-Florida)
W74-09998

THE UNCERTAIN SEARCH FOR ENVIRONMENTAL POLICY: THE COSTS AND BENEFITS OF CONTROLLING POLLUTION ALONG THE DELAWARE RIVER,
Pennsylvania Univ., Pa.
B. A. Ackerman, S. R. Ackerman, and D. W. Henderson.
University of Pennsylvania Law Review, Vol 121, No 6, p 1225-1308, June 1973. 193 ref, 2 append.

Descriptors: *Cost-benefit analysis, *Federal Water Pollution Control Act, Delaware River, *Delaware River Basin Commission, *Comprehensive planning, Water resources development, Valleys, River basin commissions, Estuaries, Environmental effects, Sewage, Municipal wastes, Water pollution, Water pollution effects, Project planning.

The scientific and economic foundations of water pollution control policy as it is evolving in the United States are examined. In 1967 the Delaware River Basin Commission (DRBC) met to adopt a massive program to control the wasteload imposed on the Delaware as it flows through Philadelphia, Pennsylvania. The DRBC had the benefit of a study in which the Delaware Estuary Comprehensive Study (DECS) attempted to quantify the costs and benefits of embarking upon a variety of clean-up programs under consideration by the DRBC. The cost-benefit analysis tendered to the DRBC by the DECS is discussed. The environmental goals selected by the DRBC are imposed upon the nation by the Federal Water Pollution Control Act Amendments of 1972. By analyzing the Delaware Valley, the pollution control objectives of the United States are evaluated. The extent to which cost-benefit analysis enhances the rationality of decisions made by functioning agencies is analyzed. Through analysis of the DECS Report, the relationship between the economist's cost-benefit methodology and alternative ways of understanding the environmental problem is considered. (Craig-Florida)
W74-09999

THE CRIME OF 'POLLUTION': THE ROLE OF FEDERAL WATER POLLUTION CRIMINAL SANCTIONS,
Environmental Protection Agency, Washington, D.C.
M. K. Glenn.
The American Criminal Law Review, Vol 11, No 4, p 835-882, Summer 1973. 208 ref.

Descriptors: *Law enforcement, *Water quality control, *Federal Water Pollution Control Act, Legislation, Pollution abatement, Permits, Water quality standards, Regulation, Water Quality Act, Water pollution control, Legal aspects, Federal government, Administrative agencies, Federal jurisdiction, State jurisdiction, Effluents, Waste disposal, Wastes, Penalties(Legal), Rivers and Harbors Act.

The provisions, Application, and effects of the Refuse Act of 1899 and the 1972 Amendments to the Federal Water Pollution Control Act include criminal sanctions as a means of abating pollution. The Refuse Act prohibits the discharge of any refuse matter into navigable United States waters. Rufuse matter has been interpreted to include pollutants. The Act has been a basis for both civil injunctive relief and criminal prosecution. In addition, the Act authorized an effluent discharge permit system which precluded the necessity for many criminal prosecutions. The 1972 Amendments prohibit the discharge of any pollutant into navigable waters by any point source unless the discharge is in accordance with the conditions and limitations of a required permit. Administrative compliance orders, civil penalties, injunctive relief, and criminal sanctions are available against negligent or willful violators. Enforcement authority is to be exercised concurrently by federal and state governments, with primary responsibility resting with the states. While the Refuse Act provided minimal punishment, the possible $25,000 per day fines for violation of the 1972 Amendments can be substantial deterrents. (Hunter-Florida)
W74-10000

REGULATION OF AIR AND WATER QUALITY IN KANSAS: A CRITICAL LOOK AT LEGISLATIVE AMBIGUITY AND ADMINISTRATIVE DISCRETION,
Kansas Univ., Lawrence. School of Law.
G. C. Coggins.

Descriptors: *Water pollution control, *Kansas, *Regulation, *Federal government, *Legislation, Public health, Water pollution sources, Water quality control, Institutional constraints, State governments, Adoption of practices, Farm wastes, Oil wastes, Sewage effluents, Administrative agencies, Decision-making, Industrial wastes, Political aspects, Treatment facilities, Construction, Water conservation.
Identifiers: *Administrative regulations, *Hazardous substances(Pollution).

The inability of state governments to meet the problem of basic water quality has resulted in the expansion of federal control over the regulation of water pollution. This pattern is illustrated in Kansas. The legislature delegated regulatory power to the unguided and uncontrolled discretion of the board of health. They in turn delegated it to the Division of Environmental Health. After several years of inactivity they were forced by the federal Environmental Protection Agency into taking a few effective steps. When not coerced, state regulators have been less than eager to eliminate pollution. The discretionary power of state agencies is lessening as federal requirements tighten. Total federal preemption is likely if the state does not take positive action with respect to effective regulation and control over administrators. However, many new statutes and regulations are pending. Kansas rivers are already polluted. The largest source of this pollution is agricultural run-off. Other sources such as sewage systems, industrial

wastes, pesticides, boats, siltation, and oil spills compound the problem. Monitoring procedures have been notoriously inadequate. However, extensive recent construction of treatment facilities is a hopeful sign that health hazards have been recognized. (Sperling-Florida)
W74-10001

A BILL TO AMEND THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972, IN ORDER TO IMPLEMENT THE PROVISIONS OF THE CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AND OTHER MATTER, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W74-10004

JOINT RESOLUTION TO SET ASIDE REGULATIONS OF THE ENVIRONMENTAL PROTECTION AGENCY UNDER SECTION 206 OF THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.
For primary bibliographic entry see Field 6E.
W74-10009

OIL POLLUTION REGULATIONS, OIL POLLUTION PROHIBITED ZONES.
Coast Guard, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10010

PHOSPHATE MANUFACTURING POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 173, p 24470-24474, Sept. 7, 1973.

Descriptors: *Regulation, *Federal Water Pollution Control Act, *Standards, *Water pollution sources, *Phosphorous, Inorganic compounds, Administration, Adoption of practices, Water quality control, Administrative agencies, Technology, Environmental sanitation, Legislation, Water conservation, Federal government, Decision making, Specifications, Effluents, Treatment facilities, Industrial waste, Wastewater disposal, Analytical techniques.
Identifiers: *Administrative regulations, *Hazardous substances(Pollution).

Effluent limitation guidelines for existing sources and standards of performance and pretreatment standards for new sources in the phosphorous industry have been issued by the Environmental Protection Agency. The Federal Water Pollution Control Act requires that by July 1977, effluent limitations for point sources other than publicly owned treatment works will be determined with regard to the best practicable control technology as defined by the Administrator of EPA. The rules show the general methodology for the development of effluent limitations and guidelines. This includes an analysis of the source, flow and volume of water used in the industrial process. The sources of waste and waste water in the operation were also considered. No significant economic impact should result from imposing the requirement of eliminating discharges of process waste water pollutants into navigable waters. The small price increases projected can probably be fully passed on to industries using the phosphates, since there are few substitutable products. (Sperling-Florida)
W74-10012

NAVIGABLE WATERS OF STATE OF WEST VIRGINIA--WATER QUALITY STANDARDS--PROPOSED RULES.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 181, p 26209-26211, September 19, 1973.

Descriptors: *Federal Water Pollution Control Act, *West Virginia, *Regulation, *Water quality control, Administrative agencies, Coordination, Thermal pollution, Administration, Federal government, Legislation, Standards, Navigable waters, Interstate rivers, Environmental sanitation, Adoption of practices, Water conservation, Data collection, Waste water disposal, Legal aspects, Water policy, Management.
Identifiers: Administrative regulations, Federal Water Pollution Control Act Amendments of 1972.

Notice is given of proposed regulations setting forth standards of water quality to be applicable to the navigable waters of West Virginia, issued pursuant to the Federal Water Pollution Control Act. Under the Act the administrator of the Environmental Protection Agency is required to review water quality standards adopted by states for interstate and intrastate waters. If changes are required he must notify the states. If the state does not adopt the revisions or if their revisions do not meet the requirements of the Act, the Administrator is to publish proposed standards in accordance with such requirements. These regulations are being issued because West Virginia did not respond to notice of the required revisions. These regulations will supersede all existing standards where there are inconsistencies. The regulations deal with effluent levels, uses of navigable waters, water temperature and other water characteristics. (Sperling-Florida)
W74-10013

CRUDE OIL SWEEP DREDGE,
E. Dilney.
Canadian Patent 943,871. Issued March 19, 1974. Patents/Brevets, Vol 102, No 12, p 1010, March 19, 1974.

Descriptors: Equipment, *Oil, *Sludge, *Patents, Water purification, Dredging, Canada, Water pollution control, Separation techniques.

An apparatus for removal of oil and sludge from the surface of water is described. The apparatus can be mounted on a vessel and has an endless bucket conveyor supported by an arm structure which extends into the water at one end and to a discharge area in the vessel at the other end. A drive moves the conveyor so it picks up oil and sludge and carries it to the discharge area. A means of supply heat is adjacent to the discharge area and aids the discharge of oil and sludge from the buckets. (Merritt-FIRL)
W74-10030

STRATEGIES IN WATER QUALITY CONTROL,
North Carolina Univ., Chapel Hill. Dept. of Economics.
W. E. McFarland.
Natural Resources Journal, Vol 12, p 318-329, July, 1972. 11 ref.

Descriptors: *Pollution abatement, *Pollution control, *Economic efficiency, *Regional economics, *Pollution taxes(Charges), *Water quality control, Economic feasibility, Resource allocation, Regional development, Administrative costs, Evaluation, Social values, Water demand, Water quality, Water control, Administration, Management, Costs, Institutions, Water allocation(Policy), Regulation, Water law.

Water quality control programs commonly have a phase to determine the desired water quality and another phase to implement the desired quality. The implementation phase is discussed and three strategies, a system of waste discharge quotas, effluent charges, and waste discharge permits market, are compared. All three strategies have common features; that is, sources of pollution must be identified, a set of water quality indicators must be found, water quality regions must be identified and designated, a monitoring system must be established, and maximum total discharges must be calculated. Provisions must be made to allow for changes in the objective water quality standard, the allocation of permits among users to achieve cost-minimization, and the discharge rate determined to achieve a specific water quality. The criteria used to evaluate the three strategies are cost of abatement, cost of administration, equity, ease of enforcement and the revenues generated. Discharge quotas faired poorly in comparison with the other two methods because as costs of abatement decrease the cost of administration increases and operation tends to be inequitable and difficult to enforce. Effluent charges are administratively efficient, abatement costs are individually determined, operation is equitable and enforcement simple. (Barnes-Florida)
W74-10058

POTABLE WATER--QUALITY GOALS,
E. L. Bean.
Journal of the American Water Works Association, Vol 66, No 4, p 221-230, April 1974. 4 photo, 1 fig, 54 ref.

Descriptors: *Water quality standards, *United States, *Public health, *Potable water, *Water quality control, Water quality, Water pollution, Standards, Solid wastes, Epidemic, Bacteria, Chemical analysis, Chemicals, Water analysis, Chemical wastes, Water pollution standards, Pollutants, Water properties, Water pollution control.

The Environmental Protection Agency (EPA) has proposed new standards for water quality. These new standards followed a realization that stricter standards would be needed to define potable water and to provide guidelines for producers of drinking water and commercial users of water. The EPA standards vary from the current United States Public Health Service standards and from the recommendations of the American Water Works Association. Generally, the EPA guidelines define high quality potable water as that which is not only safe for consumption but is clear, palatable, non-staining, non-corrosive and not too hard, or in short, water which is pleasing to the consumer. These standards represent goals that have not yet been achieved but which provide meaningful objectives. The proposed drinking water standards establish two new categories of allowable limits. One category relates to health and the other to aesthetics. The standards cover a wide range of chemicals, turbidity, odor, organisms, and tests designed to determine quantitative presence of these factors. (Barnes-Florida)
W74-10059

WATER POLLUTION PREVENTION AND CONTROL--LIST OF TOXIC POLLUTANTS,
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 129, p 18044-18045, July 6, 1973.

Descriptors: *Regulation, *Federal Water Pollution Control Act, *Water quality standards, *Water pollution effects, *Toxicity, Public health, Toxins, Water pollution, Adoption of practices, Federal government, Environmental sanitation, Chemicals, Administrative agencies, Water quality control, Standards, Waste water discharge, Effluents, Food chain, Impaired water quality, Consumptive use, Environmental effects.
Identifiers: *Administrative regulations, *Hazardous substances(Pollution).

The Administrator of the Environmental Protection Agency is proposing a list of toxic pollutants in accordance with the Federal Water Pollution Control Act. Effluent standards will be established for these pollutants or their discharge could be prohibited. Nine pollutants are listed including, aldrin, benzidine, DDD, endrin, PCB's, toxaphene, cadmium, cyanide, and mercury. Evaluation of other water pollutants is continuing and the list

will be revised. The pollutants listed in the statute are toxic in very low concentrations. A toxic pollutant is defined as a disease causing agent which, after exposure either directly or indirectly, as through the food chain, will cause deformation or disease in organisms or their offspring. Factors to be taken into account in listing a substance include toxicity, persistence, degradability, importance of affected organisms, and the nature and extent of those effects. Focus is on those pollutants which pose the most serious hazards to man and other organisms inhabiting or consuming the water. (Sperling-Florida)
W74-10060

OUTER CONTINENTAL SHELF OFF FLORIDA--POSSIBLE OIL AND GAS LEASING.
Department of the Interior, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10061

PROTECTION OF NATIONS WETLANDS--POLICY STATEMENT.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38 No 84, p 10834-1083, May 2, 1973.

Descriptors: *Coastal marshes, *Freshwater marshes, *Conservation, *Regulation, *Tidal marshes, Aquatic habitat, Wildlife conservation, Water quality control, Water pollution effects, Environmental sanitation, Ecology, Aesthetics, Biological communities, Food chain, Administrative agencies, Waste water treatment, Municipal wastes, Waste water(Pollution), Fishing, Hunting, Recreation.
Identifiers: *Administrative regulations, *National Environmental Policy Act(NEPA), *Hazardous substances(Pollution).

It is the policy of the Environmental Protection Agency to protect wetland ecosystems from destruction through waste water dischargehrough the construction of waste water treatment facilities or through other physical, chemical, or biological means. The wetland ecosystem is unique, and is sensitive to these destructive forces. They serve as a habitat for many species of fish and wildlife. They aid in the natural purification of water, and maintain and recharge the ground water resource. They are unique recreational areas high in aesthetic value. The wetlands support fishing as well as hunting. In tidal wetland areas nutrients and sediments are redistributed throughout the tidal marsh. Protection of wetland areas requires the proper placement and management of any construction activity. Alteration in quantity or quality of the natural flow of water, which nourishes the ecosystem, should be minimized. Federal funds may not be used for the construction of municipal waste water treatment facilities which interfere with the wetland ecosystem. (Sperling-Florida)
W74-10062

LIABILITY LIMITS FOR SMALL ONSHORE OIL STORAGE FACILITIES--PROPOSED RULES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10063

THE PLANNING OF A CORPS OF ENGINEERS RESERVOIR PROJECT: LAW, ECONOMICS AND POLITICS,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 6B.
W74-10064

ACQUISITION OF INFORMATION FROM OWNERS AND OPERATORS OF POINT SOURCES SUBJECT TO NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
Environmental Protection Agency, Washington, D.C.
Federal Register Vol. 38, No 75, p 9740-9742, April 19, 1973.

Descriptors: *Administrative agencies, *Adoption of practices, *Water quality standards, *Water pollution sources, *Waste water treatment, Permits, State governments, Federal government, Legislation, Regulation, Standards, Specifications, Waste water disposal, Discharge measurement, Water treatment, Industrial waste, Water pollution control, Waste treatment, Sewage effluents, Project planning, Municipal waste.
Identifiers: *Administrative regulations, *Hazardous substances(Pollution), FWPCA Amendments of 1972.

The proposed forms, guidelines, and instructions describe, pursuant to the Federal Water Pollution Control Act Amendments of 1972, procedures for the acquisition of information from owners and operators of point sources. The Administrator of the Environmental Protection Agency may issue permits for the discharge of any pollutant. The granting of the permit is conditioned upon the discharge meeting effluent limitations, water quality standards, new source performance standards, and toxic and pre-treatment effluent standards. Also monitoring, entry provisions, and guidelines establishing ocean discharge criteria must be met. States that want to administer their own permit program may submit a full and complete description of such a program to the Administrator for approval. The state, prior to approval, must have an effective continuing planning process. All owners or operators of point sources are required to apply for a permit. Special forms are required for certain municipal wastewater treatment facilities if their total discharge, population served, or quantity of industrial wastes received exceed prescribed limits. (Sperling-Florida)
W74-10069

TRANSPORTATION FOR DUMPING AND DUMPING OF MATERIAL INTO OCEAN WATERS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 65, p 8726-8730, April 5, 1973.

Descriptors: *Regulation, *Administration, *Ocean, *Waste disposal, *Adoption of practices, Decision-making, Environmental sanitation, Water conservation, Aquatic habitat, Radio-active waste disposal, Administrative agencies, Disposal, Permits, Waste dumps, Water pollution sources, Standards, Water pollution control, Water pollution effects, Legal aspects, Public health, Safety, Aesthetics, Chemical wastes.
Identifiers: *Administrative regulations, *Coastal waters, *Contiguous zone, *Hazardous substances(Pollution).

Interim regulations are issued by the Environmental Protection Agency to describe procedures for application for, and issuance and denial of, permits for ocean dumping. All dumping in the ocean or contiguous zone of the United States is prohibited without a permit. These interim regulations are effective immediately. The Administrator of the Environmental Protection Agency will establish criteria to be used in the evaluation of permit applications. These regulations also prescribe procedures for the transportation for ocean dumping of any radiological, chemical or biological warfare agents. These regulations do not apply to the dumping of fish wastes unless the dumping is in a harbor or in enclosed coastal waters. The dumping of fish wastes in any other location may be prohibited if it is found that such dumping could endanger health, the environment or ecological systems. Public notice of every complete permit application will be given to inform the public of the proposed dumping. Any person may request a public hearing to consider the issuance of any permit. (Sperling-Florida)
W74-10070

STATE CONTINUING PLANNING PROCESS--NOTICE OF INTERIM REGULATIONS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 58, p 8034-8039, March 27, 1973.

Descriptors: *Adoption of practices, *Regulation, *Project planning, *Administrative agencies, *Water quality control, *Federal Water Pollution Control Act, State governments, Federal government, Administration, Data collection, On-site data collections, Standards, Monitoring, Planning, Water pollution effects, Water pollution sources, Water conservation, Impaired water quality, Permits, Land management, Water management(Applied), Government finance, Decision making, Effluents, Municipal wastes, Water pollution treatment.
Identifiers: *Administrative regulations, *Hazardous substances(Pollution).

The Federal Water Pollution Control Act requires each state to submit a continuing planning process and these proposed regulations describe the necessary elements of that process and these proposed regulations describe the necessary elements of that process. They also set forth procedures governing planning process adoption, submission, revision, and Environmental Protection Agency (EPA) approval. The purpose of the planning process is to provide the states the water quality assessment and program management information to make centralized coordinated water quality management decisions. The process will also serve to encourage water quality objectives which acknowledge state policies for land use and other related natural resources. This information will enable the state to direct its resources, planning, monitoring, permitting, and financial assistance against water quality problems on a priority basis. Where water quality standard violations occur, an assessment will be made whether the application of best practical control technology for industry and secondary treatment for municipalities will correct the water quality problem. If not, maximum pollitant loads will be calculated. (Sperling-Florida)
W74-10071

EPA'S RUCKELSHAUS: 'FROM CARELESS INDIFFERENCE TO REMEDIAL ACTION',
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-10072

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM--PROPOSED FORMS AND GUIDELINES ACQUISITION OF INFORMATION FROM OWNERS AND OPERATORS OF POINT SOURCES.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 37, No 234, p 25898-25906, Dec. 5, 1972.

Descriptors: *Federal Water Pollution Control Act, *Regulation, *Administrative agencies, *Water pollution, *Water pollution control, Federal government, State governments, Permits, Water pollution sources, Pollution abatement, Sewage, Sewage treatment, Municipal wastes, Industrial wastes, Water policy, Water law, Effluents, Water quality, Water quality control, Water quality standards, Pollutants, Pollutant identification.
Identifiers: Federal Water Pollution Control Act Amendments of 1972, Administrative regulations.

The proposed forms and accompanying instructions describe requirements for the acquisition of information from owners and operators of point sources subject to the National Pollutant Discharge Elimination System, pursuant to the authority of the Federal Water Pollution Control Act Amendments of 1972. The Administrator of the Environmental Protection Agency may, after public hearings, issue permits for the discharge of any pollutant, upon condition that such discharge will meet all applicable requirements of the Act relating to effluent limitations, water quality standards, toxic and pre-treatment effluent standards and entry provisions. The Act also provides that states desiring to administer their own permit programs may submit a full and complete description of such a program to the Administrator for approval. With the exception of those facilities within the jurisdiction of a municipal wastewater treatment authority serving over 10,000 population, each operator of a point source of discharge of pollutants must complete and submit a short form which corresponds to the type of discharge as provided by the samples included in this proposed regulation. (Ritchie-Florida)
W74-10073

COMMUNITY ADOPTION OF WATER REUSE SYSTEMS IN THE UNITED STATES,
Clark Univ., Worcester, Mass.
For primary bibliographic entry see Field 5D.
W74-10081

REMOVAL OF OIL FROM AQUEOUS WASTES BY FLOTATION,
California Univ., Berkeley. Dept. of Chemical Engineering.
S. L. Goren.
Available from the National Technical Information Service as PB-234 023, $3.00 in paper copy, $1.45 in microfiche. Completion Report, California Water Resources Center, Davis, June 1974. (California Water Resources Center Project UCAL-WRC-W-276). 10 p, 4 fig, 2 ref. OWRR-A-034-CAL (3).

Descriptors: *Flotation, *Oil wastes, Wastes, *Electrolytes, *Separation techniques, Dispersion, Water pollution control, Waste water treatment, Oil pollution, Aqueous solutions.

The effects of electrolyte type and concentration on the separation of oil in water dispersions were examined experimentally. Flotation appears to be highly effective in removing droplets at high electrolyte concentrations or with aluminum sulfate under basic conditions. The efficiency of removal decreases with decreasing drop size limiting the effectiveness of flotation to droplets greater than several microns in diameter. (Snyder-California-Davis)
W74-10082

COST OF RURAL COMMUNITY WATER AND SEWER SYSTEMS COMPARED TO PRIVATE SYSTEMS,
South Dakota State Univ., Brookings. Agricultural Cooperative Extension Service.
For primary bibliographic entry see Field 6C.
W74-10098

WATER ATLAS OF THE UNITED STATES,
For primary bibliographic entry see Field 7C.
W74-10107

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CONSTRUCTION OF MILLSTONE NUCLEAR POWER STATION, UNIT 3, MILLSTONE POINT COMPANY, ET. AL.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-10109

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF RANCHO SECO NUCLEAR GENERATING STATION UNIT 1, SACRAMENTO MUNICIPAL UTILITY DISTRICT.
Directorate of Licensing (AEC), Washington, D.C.
Available from NTIS, Springfield, Va., as Report No. Docket 50312-121, $7.60/copy; $1.45/microfiche. Report No. Docket 50312-121, March 1973. 190 p, 17 fig, 27 tab, 87 ref, append.

Descriptors: *California, *Nuclear powerplants, Effluents, Environment, Administrative agencies, Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Pacific Ocean.
Identifiers: *Pressurized water reactors, Folsom South Canal, *Environmental impact statements.

This final environmental statement relates to the proposed continuation of construction permit and issuance of operating license for the Rancho Seco Nuclear Generating Station Unit 1. This nuclear plant is located in Sacramento County, California. The unit will employ a pressurized water reactor cooled with water from the Folsom South Canal and circulated through two natural-draft cooling towers. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes. It was concluded to continue the construction permit and issue an operating license for the facility subject to the following conditions: (1) do certain specified radiological monitoring; (2) define a comprehensive environmental monitoring program to cover plant operations; (3) conduct a rapid soil stabilization program near the plant site; and (4) provide a course of action to alleviate irreversible damage. (Houser-ORNL)
W74-10110

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2, TENNESSE VALLEY AUTHORITY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-10111

COMMERCIAL HIGH-LEVEL WASTE PROJECTIONS,
Oak Ridge National Lab., Tenn.
J. O. Blomeke, and J. P. Nichols.
Available from NTIS, Springfield, Va., as Rept. No. ORNL-TM-4224, $4.00/copy, $1.45/microfiche. Report No. ORNL-TM-4224, May 1973. 19 p, 12 tab, 9 ref.

Descriptors: *Radioactive wastes, *Nuclear wastes, *Forecasting, *Projections, Planning, Design criteria, Management, Estimating, Technology, Methodology, Assessment, Environmental effects, Radioactivity effects.

Projections of the industrial radioactive wastes from the nuclear fuel cycle over the remainder of this century are useful in the planning and design of techniques and facilities needed for their future management, and for the assessment of potential environmental effects. Projections are presented of the high-level solidified wastes to be generated through the end of this century by the U.S. nuclear power industry in the course of reprocessing spent reactor fuels. The installed nuclear electric capacity of the U.S. is taken as 134, 504, and 1200 GW at the end of calendar years 1980, 1990, and 2000, respectively. The reactor complex is assumed to consist of LMFBRs, HTGRs, and U- and Pu-fueled LWRs. It is estimated that the equivalent of 471,000 cu ft of high-level solidified wastes will have been generated through the year 2000, and that by 2010, when all of this waste has been shipped to a federal repository, it will contain 53,000 MCi of activity and evolve heat at a rate of 195 MW. (Houser-ORNL)
W74-10113

DECOMMISSIONING OF NUCLEAR FACILITIES - A BIBLIOGRAPHY.
Office of Information Services (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 6G.
W74-10119

FEEDLOT WASTE MANAGEMENT: PROGRESS AND OUTLOOK,
Texas A and M Univ., College Station. Dept. of Agricultural.
For primary bibliographic entry see Field 5D.
W74-10133

CLIMATE AND THE SELECTION OF A BEEF HOUSING AND WASTE MANAGEMENT SYSTEM,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W74-10134

EFFECT OF CONSUMPTION OF SHAVINGS ON HEMATOLOGY OF TURKEY POULTS,
Georgia Univ., Athens. Dept. of Poultry Science.
For primary bibliographic entry see Field 5C.
W74-10136

FEEDLOTS POINT SOURCE CATEGORY: EFFLUENT GUIDELINES AND STANDARDS.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 39, No 32, p 5706-5707, February 14, 1974.

Descriptors: *Feed lots, *Livestock, Poultry, Hogs, *Effluents, *Farm wastes, Technology, Economics, Dairy industry, Waste treatment, *Water quality standards.
Identifiers: Open lot, Housed lot, Stall barn, Free stall barn, Milkroom, Milking center, Process waste water, Process generated waste water.

Environmental Protection Agency guidelines and standards involving feedlots and waste production are presented. The terms feedlot, process waste water, process generated waste water, 10 year-24 hour rainfall event, 25 year-24 hour rainfall event, open lot, housed lot, stall barn, free stall barn, milkroom, and milking center are defined. Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available are presented. Also effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best available technology economically achievable are discussed. Pretreatment standards for existing sources, standards for performance for new sources, and pretreatment standards for new sources of waste are also considered. (Russell-East Central)
W74-10139

WASTE MANAGEMENT AND ANIMAL PERFORMANCE IN BEEF FEEDLOTS,
Nebraska Univ., Omaha.
For primary bibliographic entry see Field 5D.
W74-10141

EXTENDED AERATION, CLARIFICATION AND ANAEROBIC TREATMENT CYCLE,
For primary bibliographic entry see Field 5D.
W74-10166

FURTHER FIELD INVESTIGATION ON AERATED LAGOONS IN THE CITY OF WINNIPEG,
Winnipeg Waterworks, Waste, and Disposal Div. (Manitoba).
For primary bibliographic entry see Field 5D.
W74-10167

THE EFFECTS OF WATER TEMPERATURE AND ELEVATION UPON AERATION,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10168

SOURCES OF OIL AND WATER IN BILGES OF GREAT LAKES SHIPS,
Michigan Univ., Ann Arbor. Dept. of Naval Architecture and Marine Engineering.
For primary bibliographic entry see Field 5B.
W74-10191

STORAGE AND DISPOSAL OF IRON ORE PROCESSING WASTEWATER,
Michigan Technological Univ., Houghton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W74-10193

WATER LAW IN RELATION TO ENVIRONMENTAL QUALITY,
Organization: Colorado State Univ., Fort Collins. Dept. of Economics.
D. R. Allardice, G. E. Radosevich, K. R. Koebel, and G. A. Swanson.
Available from the National Technical Information Service as PB-234 144 $11.00 in paper copy, $1.45 in microfiche. Completion Report Series No. 55, Colorado State University Environmental Resources Center, Fort Collins, 561 p, 8 figures, 17 tables. March 1974. OWRR C-3107(No 3686)(2).

Descriptors: *Water law, *Prior appropriation, Riparian doctrine, Recreation, Trout streams, Beneficial use, Trout, Wisconsin, Montana, Fisheries, *Aesthetics, Low flow, *Social values, *Environmental effects.

The study was prompted because (1) of increased public concern over environmental quality; (2) but environmental degradation continues; (3) some basic water laws based upon the appropriation doctrine had no provisions for protecting environmental quality; (4) many state conservation laws have been enacted recently and an analysis of them should provide a basis for improving legal protection of environmental quality. Procedures include soliciting from several state agencies information upon the need for environmental legislation and the extent to which it had been met; reviewing and analyzing relevant literature and laws; and making site vists to 5 selected states to discuss the subjects with key officials and to inspect in the field the effectiveness of their legislation. Certain legislation is recommended for wider adoption. The unique public intervenor in Wisconsin appears highly effective. Successful stream preservation laws in several states (e.g., Montana, New York) depend upon cooperation between the state highway and conservation departments. Data presented include: participation in water based recreation projected to the year 2000; stream channel alteration, chiefly from highway construction; citations for 22 states which have wild and scenic river acts, 20 having state environmental policy acts, and 9 which have constitutional provisions regarding the environment.
W74-10202

VISCOSITY ACTUATED PHASE SEPARATING (VAPS), FOR OIL-WATER SEPARATIONS,
Union Carbide Corp., Bound Brook, N.J. Chemicals and Plastics.
R. H. Handwerk, D. J. Smith, and E. E. Griesser.
Available from NTIS, Springfield, Va 22151 as AD-763 552 Price $3.00 printed copy; $1.45 microfiche. Final Project Report 734305.2/5 to U S Coast Guard Office of Research and Development March 1973. 168 p, 25 fig, 6 tab, 16 ref. 4305 DOT-CG-24289-A.

Descriptors: *Separation techniques, *Oily water, Ships, *Viscosity, Water pollution control, *Oil pollution, *Pumps, Oil wastes, Water pollution treatment, *Pollution abatement, Oil-water interfaces.
Identifiers: *Tanker deballasting.

A viscosity-actuated phase separation (VAPS) was designed for the separation of oil and water for marine environments. An oil/water separator should eliminate oil discharge into the sea from all types of vessels. This objectives covers a broad range of oil types and volumes. Of particular difficulty, because of the high flow rates involved, are bilge pumping and tanker deballasting. Typical flow rates for bilge pumping are 100 gallons per minute while in tanker deballasting flow rates up to 10,000 gallons per minute are desirable. It is desired to reduce the oil content of the water discharge to a level of 10-20 ppm. Orbiting buttress thread devices were found to be ineffective in separating oil and water is 0.5 to 5% oil content feed streams due to excessive clearances caused by natural geometrics. The swept surface pumps tested as mechanical coalescers did some coalescing of the oil, but also produced a 'tail' of very small oil particles which were smaller than the smallest oil particles in the feed stream. The rotating buttress thread screw units can be used to separate oil and water in 0.5 to 5% oil content feed streams using oils having viscosities below 300 cp. The oil content of the discharge water was typically 100-300 ppm with some samples having less than 100 ppm. (Knapp-USGS)
W74-10231

MAN AND HIS ENVIRONMENT,
For primary bibliographic entry see Field 6G.
W74-10242

SEPARATION AND RECOVERY SYSTEMS, INC., 100-GALLON-PER-MINUTE OIL/WATER SEPARATOR,
Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
E. C. Russell.
Available from NTIS, Springfield, Va 22151 as AD-763 885 Price $3.00 printed copy; $1.45 microfiche. Final Report No 2060, May 1973. 20 p, 3 fig, 6 tab.

Descriptors: *Oily water, *Separation techniques, Emulsions, Water pollution control, Oil pollution, Waste water treatment, Ships, Sea water, Pollution abatement, Pumps.

An oily water separation system was tested to determine its suitability as a shipboard oil pollution control device. Prefilters or strainers should be included in all separation systems designed to process bilge water to help maintain coalescing efficiency and prolong element life. The supply pumps and transfer pumps used in all separation systems should be of a no-shear design with sufficient capacity to maintain rated flow with an increase in differential pressure across the system. (Knapp-USGS)
W74-10248

DEVELOPMENT OF A POLLUTION-FREE CARGO TANK CLEANING SYSTEM FOR USE ON BOARD TANKERS,
State University of New York Bronx. Maritime Coll.
For primary bibliographic entry see Field 5D.
W74-10249

COMPARATIVE ASPECTS OF COASTAL ZONE MANAGEMENT: BACKGROUND INFORMATION ON THE LAW OF TEXAS AND OTHER STATES IN VIEW OF THE COASTAL ZONE MANAGEMENT ACT OF 1972.
Texas Law Inst. of Coastal and Marine Resources, Houston.
For primary bibliographic entry see Field 6E.
W74-10272

REFINERY EFFLUENTS NEED EFFICIENT CONTROL.
For primary bibliographic entry see Field 5D.
W74-10274

DEHYDRATION OF SOLIDS BY CHEMICAL FRACTIONATION.
Boeing Co., Seattle, Wash.

Descriptors: *Patents, *Water purification, *Separation techniques, Liquids, Oil, Industrial plants, Equipment, *Distillation, *Waste water treatment.
Identifiers: Water purification tanks.

A surface layer of impurities is separated from a liquid, such as in separating an oil film floating on water, in which a flow of liquid is directed downwards onto the surface layer at sufficient speed to entrain the impurities. These are conducted to a non-contaminated region beneath the surface, where at the least the impurities are collected in a submerged opening connected to a suction source. This may be used also for removing floating scum from water purification tanks or other industrial plants. (Prague-FIRL)
W74-10282

CANADA: SEVERE PROBLEMS.
For primary bibliographic entry see Field 5D.
W74-10289

POTENTIAL ECONOMIC IMPACTS OF STATE POLLUTION CONTROLS ON DAIRY FARMS,
Michigan State Univ., East Lansing. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5D.
W74-10300

WASTE MANAGEMENT REGULATIONS AND PROPOSALS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 5D.
W74-10312

ANNUAL LITERATURE REVIEW: ADMINISTRATION, SYSTEMS ANALYSIS,
Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 6A.
W74-10322

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

NETWORK FLOW MODELING OF MULTIRESERVOIR DISTRIBUTION SYSTEMS,
Texas Univ., Austin. Center for Research in Water Resources.
For primary bibliographic entry see Field 4A.
W74-09952

A PROPOSED OPEN BEACHES STATUTE FOR FLORIDA,
Miami Univ., Fla. Ocean Law Program.
For primary bibliographic entry see Field 2J.
W74-09977

APPLICATION OF SEASONAL PARAMETRIC LINEAR STOCHASTIC MODELS TO MONTHLY FLOW DATA,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
A. I. McKerchar, and J. W. Delleur.
Water Resources Research, Vol 10, No 2, p 246-255, April, 1974. 6 fig, 2 tab, 16 ref.

Descriptors: *Hydrologic aspects, *Flow data, *Model studies, Forecasting, Mathematical studies, *Seasonal, Hydrologic data, Logarithms.
Identifiers: *Stochastic models, Parameters, Autoregressive integrated moving average, Monthly flow data, Logarithms.

Stochastic linear models are fitted to hydrologic data for two main reasons: to enable forecasts of the data one or more time periods ahead and to enable the generation of sequences of synthetic data. Short sequences of data lead to uncertainties in the estimation of model parameters and to doubts about the appropriateness of particular time series models. A premium is placed on models that are economical in terms of the number of parameters required. One such family of models is multiplicative seasonal autoregressive integrated moving average (Arima) models. Illustrated is the process of identifying the particular member of the family that fits logarithms of monthly flows, estimating the parameters, and checking the fit. The seasonal Arima model accounts for the seasonal variability in the monthly means but not the seasonal variability of the monthly standard deviations: for this reason it value is limited. The forecasting of flows one or more months ahead is described with an example. (Prague-FIRL)
W74-10053

STUDY OF WATER QUALITY PREDICTION MODELS FOR USE IN ALABAMA,
Auburn Univ., Ala. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W74-10237

UNCERTAINTY ANALYSIS IN THE ECONOMIC EVALUATION OF IRRIGATION SYSTEMS,
Bradford Univ. (England).
For primary bibliographic entry see Field 3F.
W74-10321

ANNUAL LITERATURE REVIEW: ADMINISTRATION, SYSTEMS ANALYSIS,
Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.
D. P. Loucks.
Journal Water Pollution Control Federation, Annual Literature Review, Vol 46, No 6, p 1604-1611, June 1974. 59 ref.

Descriptors: *Water pollution control, *Waste water treatment, *Management, *Design, *Systems analysis, *Planning, *Decision making, Water quality, Simulation analysis, Linear programming, Dynamic programming, *Bibliographies, Optimization, Cost-benefit analysis, Mathematical models, Taxes, *Reviews.
Identifiers: Cost-effectiveness, Separable convex programming.

The 1973 literature on the development and application of systems analysis techniques for defining and evaluating alternative water pollution control policies can be divided into: (1) general reviews; (2) regional water quality management studies; (3) economic incentives; (4) data requirements and problems; (5) water reuse analyses, the design and operation of wastewater collection networks, wastewater treatment plants, instream artificial aeration devices, and flow augmentation systems; and (6) the analysis of specific pollution problems resulting from acid mine drainage, DDT, nitrogen and thermal wastewater. Fifty-nine such documents (books, articles, and reports) pertinent to the field of wastewater treatment and water pollution control are summarized. The writings include a broad spectrum of mathematical modeling techniques, such as simulation analysis, mixed integer programming, input-output analysis, linear and nonlinear programming, dynamic programming, and other optimization methods, to estimate feasible and often minimum-cost design and management alternatives for water quality planning. (Bell-Cornell)
W74-10322

WATER-DISTRIBUTION RESEARCH AND APPLIED DEVELOPMENT NEEDS.
American Water Works Association, New York. Research Committee on Distribution Systems.
For primary bibliographic entry see Field 4A.
W74-10323

OPTIMAL PUMPING FOR AQUIFER DEWATERING,
Stanford Univ., Calif. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-10325

6B. Evaluation Process

EVALUATION AND IMPLEMENTATION OF URBAN DRAINAGE AND FLOOD CONTROL PROJECTS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
N. S. Grigg, L. Rice, L. H. Botham, and W. J. Shoemaker.
Available from the National Technical Information Service as PB-233 785 $4.75 in paper copy, $1.45 in microfiche. Colorado Environmental Resources Center, Ft. Collins, June 1974, Completion Report Series No 56. 134 p, 16 fig, 13 tab. OWRR B-086-COLO(1), 14-31-0001-4064.

Descriptors: Benefits, Budgeting, Cities, Drainage, Drainage practices, *Drainage programs, *Economic justification, Feasibility, Financial feasibility, Flood plains, *Project benefits, Runoff, *Storm drains, *Cost-benefit analysis, Financing, *Urban drainage, *Flood control, Project benefits, Project planning.
Identifiers: Drainage law.

Urban drainage and flood control (UDFC) systems provide a service to urban areas with three basic components; flood control, convenience drainage and environmental sanitation. This service is one of many provided by local government and must compete for public funding with other more visible programs such as education, transportation and public safety. The evaluation problem for UDFC arises when the merit of individual UDFC systems must be determined, when competing UDFC projects must be ranked, when optimal investment timing is sought and when the incidence of UDFC benefits and costs must be known. The results of all of these evaluations affect the funding of the UDFC sector, in competition with other public programs. UDFC systems are normally identified as minor or major in character, the former providing for the drainage of frequent runoff events, the latter providing for the rarer runoff events. The major UDFC system normally provides substantial flood damage reduction benefits while the minor system provides intangible benefits. An interim methodology for evaluating major UDFC projects is presented. It considers mostly flood damage benefits because limited data on them is available. Planned extension of the methodology will incorporate more formally intangible and indirect benefits. Because of the legal problems associated with indentifying and quantifying benefits a state-of-the-art survey on the legal basis for establishing benefits is presented. It contributes to the difficult area of financing, and implementation, necessary if UDFC are to be ultimately provided where they are needed.
W74-09802

APPLICATION OF THE LUNR INVENTORY SYSTEM FOR WATER RESOURCES PLANNING AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN,
Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
J. T. Roach, and J. W. Kelley.
Available from the National Technical Information Service as PB-233 841 $5.00 in paper copy, $1.45 in microfiche. Technical Report No 72, Water Resources and Marine Sciences Center, Cornell University, Ithaca, N.Y., April 1974. 11 fig, 15 tab, 60 ref, Partial Completion Report. OWRR B-031-NY(1), 14-31-0001-3916.

Descriptors: *Computer programs, *Data storage and retrieval, River basins, Remote sensing, Aerial photography, *Natural resources, Water resources, Planning, Management, *Land use, Information, *New York, Costs, Watersheds(Basins), Flood plains, Soil surveys, Topographic mapping, Pollution abatement, *Watershed management, Time series analysis.
Identifiers: *Susquehanna River Basin(N.Y.), Geographic referencing, Identification, Environmental impact, *Inventories, Elmira(N.Y.), Horseheads(N.Y.).

A study is made of the Land Use and Natural Resources inventory (LUNR) of New York State to demonstrate its application and management in the Susquehanna River Basin. The feasibility of combining in one data bank information needed for comprehensive water resources planning and management is explored. LUNR is a computer-based system of data storage and retrieval; it accomodates point, area and linear information which is identified, located and stored according to a geographic referencing system. Much information is obtained from remote sensing, but the system is very flexible. It is held that what occurs on the land in a river basin has an impact upon the water resources of that basin. The development, characteristics and intracacies of the LUNR system are described. First an overview and chronology are presented; data sources, base maps, scale, geographic referencing, information classification, and more are evaluated in detail. Next, examples of LUNR applications in the Susquehanna River Basin are considered. Watershed management with emphasis on flood plains, is considered in some detail. The monitoring, prediction and updating capabilities are demonstrated in a time analysis study of the Elmira-Horseheads area. Selection of appropriate imagery scale is important in terms of inventory cost and required information detail. LUNR applicability for pollution detection and surveillance and for review of environmental impact studies is discussed. It is concluded that a LUNR type natural resources inventory system with emphasis on water resources can indeed be developed for the Susquehanna River Basin. (Bell-Cornell)
W74-09807

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Division of Waste Management and Transportation (AEC), Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-09839

ENVIRONMENTAL PROTECTION AND ADMINISTRATIVE CHANGE IN STATE WATER

MANAGEMENT IN THE PACIFIC COAST STATES,
California Univ., Davis. Dept. of Political Science; and California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 6E.
W74-09951

LONG ISLAND SOUND,
For primary bibliographic entry see Field 5C.
W74-09957

THE UNCERTAIN SEARCH FOR ENVIRONMENTAL POLICY: THE COSTS AND BENEFITS OF CONTROLLING POLLUTION ALONG THE DELAWARE RIVER,
Pennsylvania Univ., Pa.
For primary bibliographic entry see Field 5G.
W74-09999

THE PLANNING OF A CORPS OF ENGINEERS RESERVOIR PROJECT: LAW, ECONOMICS AND POLITICS,
Illinois Univ., Urbana.
R. W. Findley.
Ecology Law Quarterly, Vol 3, No 1, p 1-106, Winter 1973. 553 ref.

Descriptors: *Water resources planning, *Cost-benefit analysis, History, *River basin development, *Flood control, Civil engineering, Alternative planning, Project planning, Area redevelopment, Legislation, Multiple-purpose projects, Riparian rights, Economics, Governmental interrelations, Local governments, Environmental effects, Water pollution.
Identifiers: *National Environmental Policy Act.

The Oakley reservoir project of the Army Corps of Engineers is studied in detail from its inception in 1939, through significant alterations in design and purposes, to its present status as a matter of political and legal controversy. The historical treatment elucidates the process by which a governmental agency's decisions evolve through interplay with other governmental entities and with private interests. The decision-making process followed by the Corps of Engineers in the planning of reservoir projects is analyzed critically. Special attention is given to the factors hindering adequate consideration of alternatives, to the problems of benefit-cost analysis, and to the grounds for judicial review of Corps planning decisions. The Corps' formulation and evaluation of the Oakley project is found to have been deficient in many respects, producing inaccurate estimates of benefits and costs and failing to satisfy the requirements of the National Environmental Policy Act. (Craig-Florida)
W74-10064

HOW THE STUDY STANDS NOW: INVENTORY PHASE NEARLY COMPLETE; PLANNING PHASE BEGUN.
The Urban Sea, (1974). 8 p 11 photo.

Descriptors: *River basins, *Water resources, *Water demand, *Water supply, *Water utilization, *Land use, River basin commissions, River basin development, Environmental effects, Estuaries, Urban sociology, Social aspects, Regional analysis, Water resources development, Flood plains, Legal aspects, Recreation, Water quality control, Water policy, Electric power, Project planning.
Identifiers: *Long Island Sound.

This report represents the completion of the data gathering phase of the Long Island Sound Study and attention has turned to preparing alternative planning proposals for the future. Previously published interim reports are briefly discussed, including reports concerning electric power generation, mineral resources and mining, flood plains, soils, erosion and sedimentation, as well as sources and movement of water. A summary of goals and objectives, recommendations and suggestions from the Citizen Advisory Committee is set forth. Goals were written for numerous areas, including land use and solid waste disposal, water management (both water quality and water supply), shoreline appearance and design, erosion, flood damage, recreation, fish and wildlife, transportation, minerals and mining, energy production and needed legal mechanisms. Land use issues are studied from the planner's perspective, as protection of water bodies and estuarine areas cannot be considered in isolation from general metropolitan and urban growth requirements. The study region is considered with the New York metropolitan area, and possible trends and development implications such as housing and employment are analyzed. (Sutton-Florida)
W74-10080

COMMUNITY ADOPTION OF WATER REUSE SYSTEMS IN THE UNITED STATES,
Clark Univ., Worcester, Mass.
For primary bibliographic entry see Field 5D.
W74-10081

WATER ATLAS OF THE UNITED STATES,
For primary bibliographic entry see Field 7C.
W74-10107

WATER MANAGEMENT AT ITS BEST.
Bureau of Reclamation, Washington, D.C.
Report on Water and Land Supervisors' 13th Conference, September 27-October 1, 1971, Santa Fe, N.M. 81 p.

Descriptors: *Water resources, *Water resources development, *Federal project policy, *Federal Reclamation Law, *Reclamation, Recreation, Land use, Water supply, Watershed management(Applied), Water utilization, Irrigation, Cost allocation, Cost repayment, Government finance, Inter-agency cooperation, Resources development, Water law, Legal aspects, Project planning, Cost-sharing, Water policy, Data processing, Social aspects.

Numerous conclusions and recommendations regarding development and management of resources on reclamation projects are presented. The Bureau of Reclamation should give greater recognition to the value of its recreational resources and its responsibilities for their development and management to maximize recreation benefits to the public. The Bureau should also actively pursue cooperative programs with local government and water user organizations to replace hazardous open channels with pipe, and should increase its research and support of programs leading to registration of selected herbicides for irrigation system use. A small action group, familiar with cost allocation procedures, was suggested to study the physical and financial characteristics of water use and current contractual procedures for handling changes in land and water use. Studies should be initiated to identify all beneficiaries of water resource projects to consider requiring such beneficiaries to assist with repayment of the associated federal investment. (Ritchie-Florida)
W74-10271

A METHODOLOGY FOR PLANNING LAND USE AND ENGINEERING ALTERNATIVES FOR FLOODPLAIN MANAGEMENT,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4A.
W74-10277

UNCERTAINTY ANALYSIS IN THE ECONOMIC EVALUATION OF IRRIGATION SYSTEMS,
Bradford Univ. (England).
For primary bibliographic entry see Field 3F.
W74-10321

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

COST OF RURAL COMMUNITY WATER AND SEWER SYSTEMS COMPARED TO PRIVATE SYSTEMS,
South Dakota State Univ., Brookings. Agricultural Cooperative Extension Service.
F. F. Kerr, and R. Swartout.
Extension Fact Sheet 469, 5 p, 4 tab.

Descriptors: *Rural areas, *Cost comparisons, Economics, *Sewers, *South Dakota.
Identifiers: Community water systems, *Private water systems, Sewer systems.

A simple cost analysis sheet is provided for use by individuals in rural areas to compute the economic advantage or disadvantage in joining a community water system. A series of tables are included that show the initial cost of an installed plumbing and water system and the average annual installed cost of home systems that deliver quality water under pressure or by constant flow. In the example given, it would be an economic disadvantage to join the community system if the estimated monthly charge for pressurized delivery would be more than $24.85, or the constant flow delivery more than $23.36. This analysis considers only the dollar advantage or disadvantage of joining a community system. The convenience offered by water service from a community source may be of sufficient value to some individuals to justify its use even if an economic disadvantage results. Normally the need for a community system becomes apparent when the water quality of a home system becomes inferior, when the quantity of water delivered is inadequate, or when the cost of a home system is prohibitive. (Campbell-NWWA)
W74-10098

6D. Water Demand

ECONOMIC ANALYSIS OF WATER SUPPLY NEEDS AND ALTERNATIVES IN A MULTI-COUNTY INDUSTRIAL AREA,
Clemson Univ., Dept. of Agricultural Economics and Rural Sociology.
G. H. Liner , and J. M. Stepp.
Available from the National Technical Information Service as PB-233 842 $4.50 in paper copy, $1.45 in microfiche. Report No 41, Water Resources Research Institute, Clemson University, Clemson, South Carolina, April 1974. 102 p, 10 fig, 10 tab, 42 ref, 5 append. OWRR A-021-SC(2).

Descriptors: *Water supply, *Water demand, Estimating, Long-term planning, Methodology, *Projections, *Regional analysis, *South Carolina, Water utilization, Water sources, *Alternative planning, Cost comparisons, Industrial water.
Identifiers: Alternative supply sources, Comparative economic analysis, Raw water costs, Carolina Piedmont Area, *Broad River(S.C.).

Economic, population and water use data were projected until 2020 for the 10 South Carolina counties lying wholly or partially in the basin of the Broad River, a major component of the Santee River system. An effort to make projections for subcounty areas was unsuccessful; hence the county is the unit of analysis. Actual and potential dependable water supplies in each county were estimated, and the counties with potential shortages by 2020 were identified. Two of the counties, Greenville and Spartanburg, which are adjacent to each other and could therefore use a

combined supply system, were found to be in need of 'importing' water during the period covered by the study. Several alternative water supply systems involving two sources of water were analyzed. The two sources are a proposed U.S. Army Corps of Engineers reservoir (the Clinchfield Project) in North Carolina just north of Spartanburg County, and the Duke Power Company's almost completed Keowee-Toxaway Project some 25 miles west of Greenville. Under practically all the assumptions regarding charges for water f.o.b. the source of supply, the least-cost plan was for the counties to have separate and different sources of supply. However, it was concluded that certain fairly plausible political and legal developments could render a combined system desirable.
W74-09808

WATER DEMANDS FOR EXPANDING ENERGY DEVELOPMENT,
Geological Survey, Reston, Va.
G. H. Davis, and L. A. Wood.
Geological Survey Circular 703, 1974. 14 p, 4 fig, 3 tab, 14 ref.

Descriptors: *Water demand, *Energy, *Thermal powerplants, Nuclear powerplants, Coal mines, Oil fields, Water quality, Cooling water, Industrial water.
Identifiers: Energy development.

Water is used in producing energy for mining and reclamation of mined lands, onsite processing, transportation, refining, and conversion of fuels to other forms of energy. In the East, South, Midwest, and along the seacoasts, most water problems are related to pollution rather than to water supply. West of about the 100th meridian, however, runoff is generally less than potential diversions, and energy industries must compete with other water users. Water demands for extraction of coal, oil shale, uranium, and oil and gas are modest, although large quantities of water are used in secondary recovery operations for oil. The only significant use of water for energy transportation, aside from in-stream navigation use, is for slurry lines. Substantial quantities of water are required in the retorting and the disposal of spent oil shale. The conversion of coal to synthetic gas or oil or to electric power and the generation of electric power with nuclear energy require large quantities of water, mostly for cooling. Withdrawals for cooling of thermal-electric plants is by far the largest category of water use in energy industry, totaling about 170 billion gallons per day in 1970. Water availability will dictate the location and design of energy-conversion facilities, especially in water deficient areas of the West. (Knapp-USGS)
W74-09949

WATER RECYCLING IN SOUTHERN CALIFORNIA,
For primary bibliographic entry see Field 5D.
W74-09962

SUMMARY OF FINDINGS CONCERNING WATER,
For primary bibliographic entry see Field 5C.
W74-09964

A BILL TO AUTHORIZE THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE CIBOLO PROJECT, TEXAS, AND FOR OTHER PURPOSES.
House Bill 11177, 93d Cong, 1st Sess (1973). 5 p.

Descriptors: *Legislation, *Federal reclamation law, *Water sources, *Water supply, Water storage, Water utilization, Water management(Applied), Consumptive use, Resources development, Conservation, Fish, Wildlife, Recreation, Dams, Reservoirs, Flood control, Government financing, *Texas, Multiple-purpose projects, Impoundment, Impounded waters.
Identifiers: *Cibolo project(Tex).

The Secretary of the Interior is authorized to construct, operate and maintain the Cibolo project, Texas, in accordance with the federal reclamation laws. The Secretary may take necessary actions for the purposes of storing, regulating and furnishing water for municipal and industrial use, conserving and developing fish and wildlife resources, providing outdoor recreation opportunities and controlling floods. the principal features of the project shall consist of a dam and reservoir on Cibolo Creek and public outdoor recreation facilities. The Secretary is authorized to enter into a contract with a qualified entity for delivery of water and for repayment of all the reimbursable construction costs. The conservation and development of the fish and wildlife resources and the enhancement of recreational opportunities in connection with this project shall be in accordance with provisions of the Federal Water Project Recreation Act. In excess of twenty million dollars is authorized to defray construction costs of the Cibolo reclamation project allocable to flood control, fish and wildlife, and recreation. (Ritchie-Florida)
W74-09978

HOW THE STUDY STANDS NOW: INVENTORY PHASE NEARLY COMPLETE; PLANNING PHASE BEGUN.
For primary bibliographic entry see Field 6B.
W74-10080

6E. Water Law and Institutions

INSTITUTIONAL FACTORS IN THE CREATION OF LOCAL SANITARY DISTRICTS IN WISCONSIN,
Wisconsin Univ., Madison. Land Tenure Center.
For primary bibliographic entry see Field 5D.
W74-09811

ENVIRONMENTAL PROTECTION AND ADMINISTRATIVE CHANGE IN STATE WATER MANAGEMENT IN THE PACIFIC COAST STATES,
California Univ., Davis. Dept. of Political Science; and California Univ., Davis. Div. of Environmental Studies.
G. Wandesforde-Smith.
Available from the National Technical Information Service as PB-233 931 $4.00 in paper copy, $1.45 in microfiche. Completion Report, California Water Resources Center, Davis, June 1974, 75 p. (California Water Resources Center Project UCAL-WRC-W-337). OWRR-B-142-CAL (2).

Descriptors: *State governments, *Federal government, Water resources development, *Administrative decisions, *Decision making, Social values, *Management, Social change, *Environmental control, Water pollution control, Institutions, Legal aspects.
Identifiers: *Public policy, Pacific Coast States(U.S.), *Environmental protection.

It seemed most appropriate in 1971 to propose a study of the consequences for state water agencies of the administrative changes then being introduced and contemplated in an effort to have environmental values incorporated more fully into decision making. In the previous decade there had been renewed interest on the part of all levels of government in the United States in the use, development, and management of water resources. To a large extent this interest was stimulated by the work of the Senate Select Committee on National Water Resources and by the possibility, which became apparent to some at the beginning of the 1960s, that the nation might face a water crisis. The interest has been sustained by the activities of the institutions created by the Water Resources Research Act of 1964, the Water Resources Planning Act of 1965, and the National Water Commission Act of 1968, as well as by a series of federal enactments relating to water pollution control. It is suggested that, at least in the short run and probably for some time in the future, the capacity of state water agencies to make more adequate decisions may have been substantially reduced as a result of some of the changes in administrative structure and procedures recently instituted. (Snyder-California, Davis)
W74-09951

AREAWIDE WASTE TREATMENT MANAGEMENT PLANNING IN THE WASHINGTON METROPOLITAN REGION: 1972 AMENDMENTS TO THE FEDERAL WATER POLLUTION CONTROL ACT, SECTION 208.
For primary bibliographic entry see Field 5D.
W74-09973

AMERICAN FALLS DAM, MINIDOKA PROJECT, IDAHO.
P.L. 93-206, 87 Stat. 904, 1973, U.S. Code Congressional and Administrative News, p 5117-5119.

Descriptors: *Water storage, Dams, *National recreation area, *Dam construction, *Bank erosion, *Reservoir storage, Federal jurisdiction, Water law, State jurisdictions, Appropriation, Erosion control, Flood routing, Reservoir operation, Supervisory control, Water demand, Engineering structures, Impounded waters, Reservoir fisheries, Reservoir sites, Reservoir yield, Administrative agencies, Hydroelectric plants, Cost sharing, Water resources development, Water management(Applied), Water policy, *Idaho.

The Secretary of the Interior is authorized to enter into negotiations and agreements with the American Falls Reservoir District or other appropriate agencies for the construction of a dam and related facilities to replace the existing American Falls Dam of the Minidoka project. The construction and operation of the replacement dam shall not result in an increase in the elevation of the reservoir water surface maintained by the original dam. Correction and prevention of any erosion related to the reservoir is provided as well as compensation for any unavoidable erosion to adjoining landowners. Proportionate storage rights of present space holders in the American Falls Reservoirs is unchanged by the new dam project. The constructing agency may contract with non-federal entities for the use of falling waters to generate hydroelectric power. The Secretary must approve all designs and specifications for the construction of the dam. The Secretary is also authorized to provide specific facilities for public recreation and fish and wildlife enhancement. Such facilities are financed by the Federal Water Project Recreation Act. (Kelly-Florida)
W74-09974

EXECUTIVE ORDER NO. 11735: ASSIGNMENT OF FUNCTIONS UNDER SECTION 311 OF THE FEDERAL WATER POLLUTION CONTROL ACT.
U.S. Code Congressional and Administrative News, p 2797-2800, 1973.

Descriptors: *Pollution abatement, *Administrative agencies, *Water pollution control, *Supervisory control(Power), Federal government, Administration, Regulations, Administrative decision, Jurisdiction, Coordination, Decision making, Pollutant identification, Water pollution sources, Ships, Water pollution treatment, Oil, Oil wastes, Inter agency cooperation, Federal Water Pollution Control Act.

The Administrator of the Environmental Protection Agency is empowered to exercise the Pre-

sident's authority under the Federal Water Pollution Control Act concerning the discharge of oil and hazardous substances, the identification of dispersants and other chemicals and the abatement of actual or threatened discharges from onshore or offshore facilities. He is also empowered to establish procedures, equipment, and methods to implement the abatement. The Secretary of the Department in which the Coast Guard is operating is authorized to secure the necessary relief to abate the actual or threatened discharge of oil or hazardous substances from transportation-related onshore and offshore facilities, to inspect vessels carrying such substances and to arrest persons violating the Act and its amendments. The Federal Maritime Commission is authorized to issue regulations governing evidence of financial responsibility for vessels to meet liability to the United States. The Council on Environmental Quality is authorized to provide for the preparation, publication, revision or amendment of a National Contingency Plan for the removal of oil and hazardous substance discharges. The Coast Guard is designated the appropriate agency for receiving the notice of discharge of oil or hazardous substances. (Kelly-Florida)
W74-09975

EXECUTIVE ORDER NO. 11747: DELEGATING AUTHORITY UNDER THE WATER RESOURCES PLANNING ACT.
U.S. Code Congressional and Administrative News, p 4586, 1973.

Descriptors: *River basins, *Water law, *Federal government, *Administration, *Administrative agencies, Regulation, Legislation, Supervisory control(Power), Administrative decisions, Project planning, Decision making, Planning, Water management(Applied), River basin commissions, Water resources, Water resources development, Water policy.
Identifiers: Administrative regulations.

The President of the United States by virtue of authority vested in him by section 301 of title 3 of the United States Code designates and empowers the Director of the Office of Management and Budget to perform the functions vested in the President by sections 104(b) and 204(3) of the Water Resources Planning Act. The Director is authorized therein to review and to revise plans of the river basin commissions and to transmit these plans to Congress with appropriate recommendations. He is also authorized to implement the President's powers under section 301(b) of the Act with respect to approving rules, procedures, arrangements, and provisions relating to coordination of federal planning assistance programs and utilization of federal agencies administering related programs. The Chairman of the Water Resources Council is designated and empowered to fulfill the approval function for standards and procedures vested in the President by section 103 of the Water Resources Planning Act, as amended. (Kelly-Florida)
W74-09976

A PROPOSED OPEN BEACHES STATUTE FOR FLORIDA,
Miami Univ., Fla. Ocean Law Program.
For primary bibliographic entry see Field 2J.
W74-09977

A BILL TO AUTHORIZE THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE AND MAINTAIN A LARGER AND ADEQUATE SPILLWAY, AND TO IMPROVE THE UPSTREAM SLOPE PROTECTION ON BELLE FOURCHE DAM, BELLE FOURCHE PROJECT, BELLE FO URCHE, SOUTH DAKOTA, AND FOR OTHER PURPOSES.
Senate Bill 2403, 93d Cong, 1st Sess (1973). 2 p.

Descriptors: *South Dakota, *Legislation, *Dams, *Financing, *Construction, Spillways, Reservoirs, Water storage, Slope protection, Floods, Flood control, Safety, Costs, Engineering structures, Structural engineering.
Identifiers: Belle Fourche(S.D.).

This bill, introduced by Senators McGovern and Abourezk of South Dakota, would authorize the Secretary of the Interior to construct, operate and maintain a larger and adequate spillway, and to improve the upstream slope protection on Belle Fourche Dam in Belle Fourche, South Dakota. The Secretary would also be empowered to modify or add to the structures if necessary, for the purposes of meeting flood and emergency conditions which would otherwise result in loss of life or property. Construction authorized by this Act shall be for flood control and safety of dams and not for the purpose of providing additional conservation storage capacity, or developing benefits over and above those provided by the original dam and reservoir. For these purposes, $3,250,000 is authorized plus or minus such amounts as may be justified by reason of changes in construction costs. (Ritchie-Florida)
W74-09979

A BILL AUTHORIZING THE CONSTRUCTION OF A DAM AND RESERVOIR ON THE LITTLE WHITE RIVER, SOUTH DAKOTA (ROSEBUD SITE).
Senate Bill 2402, 93d Cong, 1st Sess (1973). 2 p.

Descriptors: *South Dakota, *Legislation, *Dams, *Construction, *Financing, Flood control, Recreation, Sediment control, Water supply, Flow, Regulation, Irrigation, Hydroelectric power, Rivers, Reservoirs, Reservoir construction, Drainage, Federal government, Appropriations, Beneficial use, Impoundments, Multiple-purpose reservoirs.
Identifiers: *Little White River(S.D.).

This bill, introduced by Senator McGovern and Senator Abourezk of South Dakota, would authorize the Chief of the Army Corps of Engineers to plan, construct and operate a multiple-purpose dam and reservoir on the Little White River (Rosebud Site) just north of the Mellette-Todd County line. The structures would be built in the interest of flood control, recreation, sediment storage, water supply, low-flow, regulation, limited irrigation and hydroelectric power. (Ritchie-Florida)
W74-09980

COASTAL WETLANDS PROTECTION LAW.
Miss. Code Ann., secs. 49-27-1 thru 49-27-29 (Supp. 1973).

Descriptors: *Mississippi, *Permits, *Wetlands, *Aquatic habitats, Conservation, Legislation, Administration, Adoption of practices, Coastal Structures, State governments, Regulation, Wildlife conservation, Shore protection, Coastal engineering, Piers, Docks, Public health, Decision making, Environmental effects, Plants, Highways, Recreation, Water sports, Animals, Legal aspects, Economic aspects, Administrative agencies, Project planning, Water pollution sources.
Identifiers: *Administrative regulations, Certification, Coastal waters, Environmental impact statement, Fill permits.

It is declared a Mississippi state policy to favor the preservation of the natural state of the coastal wetlands and their ecosystems. Exceptions to this policy of preservation are granted when a specific alteration of the wetlands would serve a higher public interest. A permit is required for dredging, filling, killing the fauna and flora, and for any structure which materially affects the ebb and flow of the tide. Permits are not required for state agencies, riparians, or for hunting or recreational activities. Each application for a permit will include a detailed description of the proposed activity and a map showing the area of coastal wetlands to be affected. The map will also show the location and area of other regulated activities, as well as all existing and proposed structures. The application will also include the project cost and purpose, along with a description of the public benefit to be derived from the project. Measures to be taken to reduce off-site effects and an environmental impact statement should be included. (Sperling-Florida)
W74-09981

POWER PLANTS AND COTTONTAILS,
Cornell Univ., Ithaca, N.Y.
For primary bibliographic entry see Field 5G.
W74-09982

INVERSE CONDEMNATION--STREAM POLLUTION AS TAKING OF PROPERTY FOR PUBLIC USE.
For primary bibliographic entry see Field 5G.
W74-09983

LABAUVE V. LOUISIANA WILDLIFE AND FISHERIES COM'N. (ACTION TO ENJOIN ENFORCEMENT OF STATUTE).
289 So. 2d 150 (La. 1974).

Descriptors: *Commercial fishing, *Louisiana, *Fish conservation, *Constitutional law, *Equity, *Judicial decisions, Regulation, Water law, Legislation, Fish management, Wildlife conservation, Fisheries, Marine fisheries, Bodies of water, Water resources, Law enforcement, State governments, Water rights, Legal review, Legal aspects.

Plaintiffs, commercial fishermen, brought action against the Louisiana Wildlife and Fisheries Commission to enjoin enforcement of a criminal statute prohibiting the use of gill nets south of the Intracoastal Canal in Terrebonne and Lafourche Parishes. The Civil District Court granted injunctive relief and appeal was taken. The Supreme Court of Louisiana reversed on the ground that equity powers will be invoked to restrain the enforcement of criminal statutes only where the complaining party establishes the clear invasion of a property right, threatened irreparable injury, and the manifest unconstitutionality of the statute. The plaintiff had no proprietary interest in the fish he was prevented from catching; the fish were in state waters, and ownership of all fish existing in state waters is in the state. Plaintiff's fishing license was a privilege granted by the state, and the state had the right to interfere with this privilege in the exercise of its police powers. (Hunter-Florida)
W74-09984

A BILL TO EXPAND THE NATIONAL FLOOD INSURANCE PROGRAM BY SUBSTANTIALLY INCREASING LIMITS OF COVERAGE AND TOTAL AMOUNT OF INSURANCE AUTHORIZED TO BE OUTSTANDING AND BY REQUIRING KNOWN FLOOD-PRINE COMMUNITIES TO PARTICI PATE IN THE PROGRAM, AND FOR OTHER PURPOSES.
Senate Bill 1495, 93d Cong, 1st Sess (1973). 13 p.

Descriptors: *Legislation, *Floods, *Flood plain insurance, Insurance, Compensation, Costs, Damages, Protection, Flood damage, Flood plain zoning, Non-structural alternatives, Flood protection, State governments, Cities, Government financing, Economics, Governmental interrelations, Disasters, Federal government.
Identifiers: *National Flood Insurance Act of 1968.

The Congress has found that annual losses from floods and mudslides are increasing at an alarming rate, largely as a result of the accelerating development of, and concentration of population in, areas of flood and mudslide hazards. The purpose of this

bill, the Flood Disaster Protection Act of 1973, is therefore, to substantially increase the limits of coverage authorized under the national flood insurance program. It also provides for the expeditious identification of, and the dissemination of information concerning, flood-prone areas. States and local communities, as a condition of future Federal financial assistance, must participate in the flood insurance program and must adopt adequate flood plain ordinances with effective enforcement provisions consistent with Federal standards to reduce or avoid future flood losses. The bill also requires the purchase of flood insurance by property owners who are being assisted by Federal programs. This bill thus amends the National Flood Insurance Act of 1968 by increasing the limits of coverage for each particular type of property and also raises the limitation on coverage outstanding under that Act to ten billion dollars. The Secretary of Housing and Urban Development is authorized to issue regulations to carry out this Act. (Ritchie-Florida)
W74-09985

POLLUTION CONTROL: PRELIMINARY MANDATORY INJUNCTION TO PREVENT, CORRECT OR REDUCE EFFECTS OF POLLUTING PRACTICES,
J. J. Michalik.
49 ALR3d 1239 (1973).

Descriptors: *Judicial decisions, *Pollution abatement, *Industrial wastes, *Water quality control, *Legal aspects, Watershed management, Mining, Coal mines, Mine wastes, Mine water, Strip mine wastes, Waste dumps, Waste disposal, Pollution control, Pollutants, Contaminants, Chemicals, Chemical wastes, Water pollution sources, Water pollution, Chemical waste discharge, Pennsylvania, Texas, Bayous, Watershed protection, Pollution effects.

This annotation collects the cases in which the courts have expressly considered the use of a preliminary mandatory injunction as a means of preventing, correcting or reducing the effects of polluting practices. Very stringent prerequisites must be demonstrated before the courts will issue a mandatory injunction of this nature. The right of the applicant must be clear, the injunction must be necessary to prevent irreparable or serious inuury, and the applicant's remedy at law must be inadequate. Only two cases have been found in which preliminary mandatory injunctions have been considered. In West Penn Water Co. v. Sunnyhill Coal Co., the court refused to grant the injunction to prevent further contamination or pollution of a public water company's water supply by three coal companies' mining operations, on the grounds that the damage was already done and could not be undone by any available remedy. The court in Rhodia, Inc. v. Harris County, however, in an action to restrain a chemical company from discharging wastes containing excessive arsenic into or adjacent to a bayou, sustained those provisions of the injunction requiring the company to do whatever was necessary to prevent surface and tidal waters from carrying the arsenic to the bayou. (Silber-Florida)
W74-09986

PRESIDENT'S MESSAGES: VETO OF H.R. 3298--RURAL WATER AND SEWER GRANTS.
U.S. Code Congressional and Administrative News, p 863, 864, 1973.

Descriptors: *Utilities, *Public utilities, *Public works, *Federal project policy, *Community development, Water works, Water supply, Water distribution(Applied), Local governments, Sewerage systems, Sewerage disposal, Federal government, Federal budget, Political aspects, Legislation, Laws, Constitutional law, Water utilization, Rural areas, Projects.

In 1973, the President vetoed H.R. 3298, in which Congress sought to revive a program of Federal grants for rural water and sewer projects. The President had terminated the program earlier through the impoundment of funds. In his veto message, the President severely criticized the effects of the program as unjustifiably increasing taxes, and doubly taxing the nonrural taxpayer. In addition, the program made the federal government responsible for services which are local in nature, and induced some rural communities to delay construction of water and sewer facilities while they wait in line for federal subsidies. The President questioned the constitutionality of the bill's provision which mandates the spending of the full amount appropriated. In encouraging Congress to sustain his veto, the President noted that the 1974 budget already includes $345 million in Rural Development loan funds and that the Environmental Protection Agency will be providing $5 billion in 1973 and 1974 for waste disposal. The President promised that, if his veto was sustained, he would use his authority to provide rural communities with loans for water and sewerage facilities. (Hunter-Florida)
W74-09987

ARKANSAS RIVER BASIN COMPACT.
U.S. Code Congressional and Administrative News, P.L. 93-152; 87 Stat. 569, p 4081-4089, 1973.

Descriptors: *Interstate compacts, *River basin development, *River regulation, *Water yield, *Legislation, River basins, Basins, River basin commissions, River systems, Watersheds, River flow, River forecasting, Streamflow forecasting, Interstate commissions, Riparian waters, Arkansas, Oklahoma, Interstate rivers, Equitable apportionment, Water policy, Watershed management, Watershed protection, Water conservation, Water storage, Water supply, Water utilization, Water pollution abatement, Water pollution control, Water resources development.
Identifiers: *Arkansas River.

A compact between Arkansas and Oklahoma was approved by Congress for the purposes of water resource apportionment, pollution abatement, and development and management of water resources. Rights to use and develop the Arkansas river's various sub-basins are apportioned between the two signators; use is limited, however, so that the sub-basin's annual yield is not depleted below a maximum percentage. Depletion in excess of this percentage empowers the Arkansas-Oklahoma Arkansas River Compact Commission to deliver the excess to the injured downstream state. The signators agree to continue individual state efforts to abate pollution and to co-operate in these efforts regarding the Arkansas River basin; they also agree to enter into joint programs for control of sources which pollute the Arkansas River. The Commission consisting of representatives from both states is given broad powers to administer the compact, and each state pays its share of administrative expenses. (Hunter-Florida)
W74-09988

JELLYFISH CONTROL.
Committee on Merchant Marine and Fisheries (U.S. House).
H. R. Report No 91-1192, 91st Cong, 2d Sess, (1970).

Descriptors: *Fish control agents, *Federal project policy, *Legislation, *Jelly fish, *Aquatic algae, *Nuisance algae, Commercial shellfish, Oysters, Aquatic animals, Aquatic life, Aquatic invertebrates, Legal aspects, Cost sharing, Grants, Financing, Projects, Research and development, Research priorities, Testing, Research facilities, Costs, Estuaries, Oceans, Coasts, Shores, Sport fishing, Commercial fishing, Fish management.

Enactment is recommended of a bill which extends the program to provide for the control or elimination of jellyfish and other such pests in the coastal waters of the United States. The need for legislation arises from the fact that thousands of vacationers are precluded from water-recreational opportunities and hundreds of businessmen are deprived of revenues due to the presence of jellyfish and other such pests in United States waters. The jellyfish, or sea nettle, has two life phases, a small nearly microscopic 'plantlife' stage and the familiar umbrella-shaped swimming stage. It is during this second stage that the jellyfish has tenacles containing stinging cells. For the past three years, efforts have been directed towards research in hopes of developing techniques to control or eliminate jellyfish, and the states of Connecticut, Florida, Maryland, Mississippi, New York, Puerto Rico, and Virginia have conducted studies and have shared the costs equally with the federal government. A description of these state studies is included. The bill authorizes the Secretary of the Interior to appropriate funds for the continuation of research and the development and implementation of control techniques. (Ritchie-Florida)
W74-09989

UNION WATER SUPPLY CORP. OF GARCIASVILLE V. VAUGN (PROCEEDINGS ON MOTION TO DISMISS ACTION BY NONPROFIT CORPORATION ATTACKING CANCELLATION OF ITS WATER PERMIT).
355 F. Supp. 211-217 *S.D. Texas 1972).

Descriptors: *Judicial decisions, *Texas, *Legal aspects, *Water supply, *Water permits, *Rio Grande River, River beds, Riparian waters, Riparian rights, Water law, Water utilization, Water permits, Water rights, Water allocation(Policy), Water distribution(Applied), Domestic water, Water supply developments, Water demand, Water resources development, Water utilization.

The plaintiff, Union Water Supply Corporation, conducts business on a non-profit basis and was organized for the purpose of furnishing and distributing treated domestic water to its subscribers. Plaintiff contends that individuals have a constitutional right to use water from the Rio Grande River for livestock and domestic purposes, and that the defendant unconsititutionally deprived plaintiffs of that right by terminating a temporary water permit. Plaintiffs assert that, by denying water to the individual plaintiffs who joined this action, the defendants are denying a right, privilege, and immunity guaranteed to them by the Fourteenth Amendment. Plaintiffs argue that individuals having a right to domestic and livestock usages of water be allowed to appoint an agent to draw the water from the river, purify it, and disseminate it to households. The District Court held that states have authority to establish for themselves such rules of property as they may deem expendient with respect to the streams of water within their borders both navigable and non-navigable, and the ownership of the lands forming their beds and banks, subject to the authority of Congress over navigation. Thus the termination of the water permit did not violate the plaintiffs' constitutional rights. (Ritchie-Florida)
W74-09990

APPLICATION OF FEDERAL WATER POLLUTION CONTROL ACT REQUIRING NOTICE TO FEDERAL AGENCY OF PROHIBITED DISCHARGE FROM A VESSEL OR FACILITY,
D. B. Levendusky.
17 A.L.R. Fed. 804 (1973).

Descriptors: *Judicial decisions, *Legislation, *Pollutes, *Legal aspects, *Water law, Oily waters, Pollution prevention, Pollution control, Pollution abatement, Pollution sources, Federal government, Administrative agencies, Water quality, Water quality control, Industrial wastes, Vessels, Navigable waters, Facilities, Waste disposal, Waste water, Water pollution sources,

Ultimate disposal of wastes, Water conservation, Environmental effects, Water injury, Law enforcement, Water policy.
Identifiers: Non-point sources(Pollution).

One provision of the Federal Water Pollution Control Act requires any person in charge of a vessel or an onshore or offshore facility to notify an appropriate governmental agency of prohibited discharges from such vessel or facility. The Act makes failure to give such notification a crime, and states that notification or information obtained from the notification's exploitation is not to be used against any such person in any criminal case, with certain exceptions. This annotation collects and analyzes the federal cases in which the above described provision of the Act has been construed or applied by the courts. A defendant corporation has been held to be the 'person in charge' to whom the immunity provision was applicable. The courts have noted the legislative intent of (1) insuring the timely discovery of abatable hazards and (2) facilitation and implementation of measures calculated to minimize pollution damages as their basis for so holding. Moreover, without a reporting requirement and the subsequent immunity many discharges of oil would go undetected. The owner-operator is the only source readily available to make timely discovery of oil discharges and call the accident to the attention of those who can prevent its spread and abate it. (Silber-Florida)
W74-09991

A BILL TO AMEND THE FISH AND WILDLIFE COORDINATION ACT BY PROVIDING FOR THE REGULATION OF DUMPING IN UNITED STATES WATERS.
House Bill 2493, 93rd Cong, 1st Sess (1973). 5 p.

Descriptors: *Federal government, *Legislation, *Water pollution sources, *Regulation, Wildlife conservation, Aquatic life, Administration, Decision making, Coordination, State governments, Permits, Legal aspects, Water quality, Water conservation, Administrative agencies, Standards, Industrial wastes, Environmental sanitation, Waste water disposal, Sewage disposal, Water resources, Water pollution, Water treatment, Public health, Environmental effects.
Identifiers: Coastal waters, Administrative regulation, Licenses.

This bill would provide protection to marine and wildlife ecology by the regulation of dumping in the ocean, coastal, and other waters of the United States. The Secretary of the Interior and the Administrator of the Environmental Protection Agency will establish standards for the deposit or discharge of all industrial wastes, sludge, and other materials in the country's waters. The purpose of the standards is to insure that no damage to the environment or the ecology will result from such activities. Before any such deposition of materials occurs the party desiring to so discharge has the burden of proving it harmless. The standards will be enforced by any agency, federal or state, that issues a license or permit for such activities in coastal waters. The states are free to develop their own standards as long as they are more stringent than the federal standards, and as long as there are adequate procedures for enforcement. Anyone applying for authorization to dispose of material is required to maintain records to assist in establishing standards. All previous licenses issued by the United States are terminated on the effective date of this bill. (Sperling-Florida)
W74-09992

RULES PERTAINING TO STANDARDS FOR SUBSURFACE SEWAGE AND NON-WATER-CARRIED WASTE DISPOSAL.
Oregon State Dept. of Environmental Quality, Portland.
For primary bibliographic entry see Field 5E.
W74-09993

FLOODING PROBLEMS ASSOCIATED WITH CURRENT HIGH LEVELS OF THE GREAT LAKES.
Michigan Dept. of Natural Resources, Lansing. Water Development Services Div.
For primary bibliographic entry see Field 2H.
W74-09994

POLICY FOR LOCATION OF OFFSHORE PORTS AND OIL REFINERIES IN COASTAL AREAS,
North Carolina Dept. of Natural and Economic Resources, Raleigh. Office of Industrial Tourist and Community Resources.
For primary bibliographic entry see Field 5G.
W74-09995

WASTE TREATMENT FUND ALLOCATIONS.
U.S. Code Congressional and Administrative News, P.L. 93-243, 87 Stat. 1069, p 5308-5309, 1973.

Descriptors: *United States, *Waste water treatment, *Waste water(Pollution), *Legislation, *Construction costs, *Water pollution treatment, Federal government, Treatment facilities, Sewage disposal, Waste water disposal, Cost allocation, Federal budgets, Water quality, Water demand, Water supply.

This Act will amend the Federal Water Pollution Control Act as to establish the ratio for allocation of treatment works construction grant funds, to insure that grants may be given for other than operable units and to clarify the requirements for development of priorities. The ratio shall now be determined one-half on the basis of table I of the House Public Works Committee Print Numbered 93-28 and one-half on the basis of table II of such print, except that no state shall receive an allotment less than that which is received for the fiscal year ending June 30, 1972, as set forth in table III of such print. The Administrator shall not require any state to consider in the development of priority rankings, any pollution control agreement which may have been entered into between the United States and any other nation, and shall not consider any such agreement in the approval of any such priority ranking. The Act also calls for the Administrator to make a preliminary detailed estimate of any such construction and submit it to Congress at a specified time, and for each state to prepare a cost estimate of each proposed project. (See also W74-09997) (Sutton-Florida)
W74-09996

WASTE TREATMENT FUND ALLOCATIONS--LEGISLATIVE HISTORY.
U.S. Code Congressional and Administrative News, P.L. 93-243, p 5974-5985, 1973.

Descriptors: *Sewage, *Federal Water Pollution Control Act, *Federal project policy, *Cost allocation, *Sewage treatment, *Public utilities, Legislation, Wastes, Federal government, Federal budget, Water pollution, Sewage disposal, Primary treatment, Secondary treatment, Waste treatment, Sewerage, Sewage districts, Water pollution sources, Sewage effluents, Organic wastes, Industrial wastes, Waste disposal.

The Committee on Public Works recommended an amendment to the Federal Water Pollution Control Act. The bill provides the following formula for the allocation of sewerage treatment facility construction grants in 1975. Twenty-five per cent of the total allotted funds are to be allocated among the states in the ratio that the 1972 population of each state bears to the population of all states and seventy-five per cent of the funds shall be allocated on the basis of a needs survey conducted by the Environmental Protection Agency (EPA). The Committee recommended the concededly irrelevant criteria of population because the transition from the 1965 population criterion to the 1972 needs criterion had substantially reduced allocations to certain states in 1972, and had set back their existing programs. Furthermore, the EPA needs survey had several admitted shortcomings. The proposed amendment mandates that the EPA complete a new comprehensive, detailed, and accurate needs survey by June, 1974. The bill seeks to permit a 'phased funding approach' whereby each state may use its annual allocation among as many qualified projects as it wishes, rather than fully fund a few projects each year. (See also W74-09996) (Hunter-Florida)
W74-09997

THE 1972 CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AT SEA,
For primary bibliographic entry see Field 5G.
W74-09998

THE CRIME OF 'POLLUTION': THE ROLE OF FEDERAL WATER POLLUTION CRIMINAL SANCTIONS,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10000

REGULATION OF AIR AND WATER QUALITY IN KANSAS: A CRITICAL LOOK AT LEGISLATIVE AMBIGUITY AND ADMINISTRATIVE DISCRETION,
Kansas Univ., Lawrence. School of Law.
For primary bibliographic entry see Field 5G.
W74-10001

OBSTRUCTIONS IN STREAMS AND DRAINAGE DITCHES.
N.C. Gen. Stat., sec. 77-14 (1969).

Descriptors: *Surface drainage, *Surface waters, *Drainage systems, *North Carolina, *Legislation, Drainage engineering, Land management, Ditches, Enforcement, Drainage programs, Water flow, Water policy, Water law, Drainage practices, Surface runoff, Statues, Dams, Weirs, Penalties(Legal), construction.

Any person, firm, or corporation who shall cause any natural or artificial material to be placed in any creek, stream, river, or natural or artificial drainage ravine or ditch, or in any other outlet which serves to remove water from any land shall be guilty of a misdemeanor. The purpose is the maintenance of natural and normal land drainage. Punishment for offenders is stated. The authorized construction of any dam or weir is excepted from the statutory control. (Proctor-Florida)
W74-10003

A BILL TO AMEND THE MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT OF 1972, IN ORDER TO IMPLEMENT THE PROVISIONS OF THE CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AND OTHER MATTER, AND FOR OTHER PURPOSES.
House Bill 5450, 93d Cong, 1st Sess (1973). 5 p.

Descriptors: *Federal government, *Legislation, *Oceans, *Waste disposal, *Waste dumping, Water quality, Water quality control, Permits, Regulation, Standards, Water policy, Administrative agencies, Sea water, Pollution control, Pollution protection, Pollution prevention, Environment, Environmental sanitation, Ecology, Industrial wastes, Agricultural wastes, Marine life, Aquatic life, Water management.

This Bill would amend the Marine Protection, Research and Sanctuaries Act of 1972(Act) to provide that material including, but not limited to, dredged material, solid waste, incinerator residue,

garbage, sewage, sludge, munitions, radiological, biological and chemical warfare agents, radioactive materials, chemicals, laboratory wastes, wrecked or discarded equipment, debris, industrial, municipal, agricultural and other wastes shall not be deposited in the waters or oceans except as authorized by a permit issued subject to the regulations of the Coast Guard. Standards adopted by the Convention on Prevention of Marine Pollution by Dumping of Wastes and Other Matter shall apply to all U.S. vessels as well as those operating and eminating from any other member nation to the Convention while transporting materials to the United States. Permits shall be issued where the Administrator determines that such dumping will not unreasonably degrade or endanger human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities. (Silber-Florida)
W74-10004

ROBINSON V. ROBBINS PETROLEUM CORP. (ACTION FOR WRONGFUL TAKING OF SALT WATER FROM WELL).
501 S.W.2d 865 (Tex. 1973).

Descriptors: *Texas, *Judicial decisions, *Secondary recovery(Oil), *Flooding, *Injection, *Oil wells, Oil, Oil industry, Water rights, Water law, Legal aspects, Saline water, Leases, Oil reservoirs, Drill holes.

The question presented is the right of the surface owner of a tract to recover damages from the operator and owners of a secondary recovery unit for salt water taken from his tract for purposes of waterflooding the entire unit. The petitioner, surface owner, acquired his surface estate subject to the respondent's oil lease. The respondent was using a former oil well located on petitioner's land to produce salt water to be injected and to drive three waterflood units. Under comparable words to those used in the conveyance to petitioner in this case, the Supreme Court of Texas decided that water is an incident of surface ownership, and refused to distinguish between salt and fresh water. There was no proof in the record of the necessity for the waterflood operation to obtain production of oil by the lessee. Mineral owners are entitled to that amount of salt water reasonably necessary to produce oil under the premises, and the petitioner was entitled to recover damages for salt water used to produce oil on lands outside the lease. (Ritchie-Florida)
W74-10005

PRETREATMENT STANDARDS FOR SEWERAGE.
N.J. Stat. Ann., ch. 58: 11-49 to 58: 11-58 (Supp. 1973).

Descriptors: *New Jersey, *Legislation, *Regulation, *Pre-treatment(Water), *Waste water treatment, Water pollution treatment, Sewage treatment, Treatment facilities, Water pollution control, Water pollution sources, Drainage water, Industrial wastes, State governments, Adoption of practices, Decision making, Administration, Water conservation, Waste disposal, Waste dilution, Sewage effluents, Environmental sanitation.
Identifiers: Administrative regulations, Hazardous substances(Pollution).

Certain sewage discharged into treatment plants has damaged the processes in the plant because of the characteristics and potency of particular discharges. This statute seeks to prevent this damage by the adoption of rules and regulations requiring the treatment of certain wastes prior to their discharge into sewerage systems. In the establishing of such rules the New Jersey State Commissioner of Environmental Protection will consider: the treatment capabilities and operating efficiency of the plant or plants to which they apply, and the standards required of the effluent of such plant or plants in conformity with the state's policy concerning the prevention and abatement of pollution. To enforce this act anyone wanting a sewage connection to discharge sewage which consists of industrial waste must make an application providing full information as to the quantity, character, and composition of sewage. The appropriate agency is charged with making or causing to be made an inspection of discharge facilities. The violation of any provision of this statute is subject to a $5,000 fine. (Sperling-Florida)
W74-10006

LYTWYN V. TOWN OF WAWARSING (ACTION FOR DAMAGES RESULTING FROM SURFACE WATER SPILLING ONTO PLAINTIFF'S PROPERTY).
349 N.Y.S.2d 35 (Sup. Ct. 1973).

Descriptors: *Judicial decisions, *Public rights, *Water policy, *Water distribution(Applied), *Legal aspects, *Drainage water, Local governments, Water law, Legislation, New York, Public health, Runoff, Cloudbursts, Water control, Drainage systems, Excess water(Soils).

Plaintiff brought action to recover damages for a loss sustained to their property during a heavy rainstorm. They contended that the loss was occasioned when surface waters collected by a drainage ditch allegedly constructed by defendant, caused water to spill over onto their property, washing out their driveway, lawn and garden. On this appeal, it was contended the court's charge to the jury constituted prejudicial error. The charge was based on the court's interpretation of a statute, which provided that as a condition precedent to the recovery of damages, real or personal, by reason of a culvert being defective, prior written notice, or facts amounting to constructive notice, plus the passage of a reasonable time within which to cure such defect must first be shown. Plaintiff contended that the condition precedent was not applicable where the town has committed an affirmative act which is alleged to be the direct cause of damages sustained. The appeal court held for the plaintiff, stating the affirmative act of creating such a ditch was wrongful even though there was no negligence in its construction or maintenance. With this affirmative act neither prior written nor constructive notice need be shown. The court ordered a new trial to determine whether in fact the defendant had created the ditch, and whether the resulting damage was due to the severe rainstorm or the so-channeled ditch. (Sutton-Florida)
W74-10007

CARLINO V. BARTON (ACTION TO DETERMINE TITLE TO LAND ALONG SHORE AND UNDER LAKE).
349 N.Y.S.2d 535 (Sup. Ct. 1973).

Descriptors: *Lakes, *Judicial decisions, *Adjudication procedure, *Prescriptive rights, *Boundary disputes, Legislation, Water rights, *New York, Boundaries(Property), Lake beds, Legal aspects, Remedies, Ownership of beds, Riparian rights, Water law.

Plaintiffs, landowners, brought action, contending that the description in a deed, which included 'along the shores,' conveyed both the waters to the center of the lake and the land thereunder. The Court held the deed transferred only the land extending to the low water mark of the lake. The Court based its decision on the rule that if a description in a conveyance describes the title as being along dry land such as a bank or shore, then it excludes or reserves title in the non-navigable waters. However, if the boundary is described in terms of the water or along or by the water, the presumption remains that title is carried to the center of the water. A description of the boundary as 'by the shore,' constitutes a clear and express restriction not to convey title to the center of adjacent non-navigable water, but rather a limitation of conveyance to the edge of the waters. Although plaintiffs' claim of title to the center of the lake was rejected, the Court held that the plaintiffs had established their right to enter and use the lake waters by prescription, and defendants who interfered with that right were guilty of a trespass. (Sutton-Florida)
W74-10008

JOINT RESOLUTION TO SET ASIDE REGULATIONS OF THE ENVIRONMENTAL PROTECTION AGENCY UNDER SECTION 206 OF THE FEDERAL WATER POLLUTION CONTROL ACT, AS AMENDED.
Senate Joint Resolution 158, 93d Cong, 1st Sess (1973). 4 p.

Descriptors: *Environment, *Federal project policy, *Water resources development, *Water pollution control, *Cost sharing, *Federal budget, Federal government, Legislation, Multiple-purpose projects, Water pollution, Water policy, Project planning, Cost allocation, Decision making, Administration, Coordination.

The regulations pursuant to section 206 are found to be illegal. They discriminate among projects constructed between June 30, 1966 and July 1, 1972, by failing to allocate appropriated funds equally to each qualified project in the ratio that the unpaid balance of the reimbursements due bears to the total unpaid balance to all such projects, thereby preventing many states from receiving any funds to which they are entitled under the section. Any such regulations under section 206 are set aside and are declared to be of no legal effect. To correct this, the Administrator of the Environmental Protection Agency shall submit to Congress within 30 days regulations implementing section 206 so as to effect an equitable allocation of appropriated funds among all qualified projects. Upon submitting the regulations to Congress, the Administrator shall notify each state and within 30 days after such notice each state shall submit a complete list of qualified projects to receive reimbursement. Notwithstanding the requirements of subsection (c) of section 206 applications for assistance under that section may be filed with the Administrator until November 18, 1973. (Sutton-Florida)
W74-10009

OIL POLLUTION REGULATIONS, OIL POLLUTION PROHIBITED ZONES.
Coast Guard, Washington, D.C.
Federal Register, Vol 37, No 103, p 10670, May 26, 1972.

Descriptors: *Legislation, *Regulation, *International law, *Treaties, *Oil pollution, Pollution abatement, Water pollution, Water pollution sources, Water pollution control, Coast guard regulations, Oceans, Oily water, Oil, Oil spills, Foreign waters, Ships, Water law, Legal aspects.
Identifiers: *Administrative regulations.

Federal legislation requires publication in Coast Guard regulations and in Notices to Mariners of extensions of prohibited zones adopted under the Convention for the Prevention of the Pollution of the Sea by Oil. Several such extensions have been effectuated by treaty since the last revision. The following prohibited zones have been added by amendment: The Spanish Zone and the Portuguese Zone, comprised of that portion of the Atlantic Ocean 100 miles off the coast of Spain and Portugal, respectively; the Mediterranean and Adriatic Zones comprising the sea areas within a distance of 100 miles from the nearest land bordering the Mediterranean and Adriatic Seas. Other added zones include the Black Sea and Sea of Azor Zone, the Red Sea Zone, the Kuwait Zone and the Saudi Arabian Zone. This amendment became effective on June 30, 1972. (Ritchie-Florida)
W74-10010

ENVIRONMENTAL STATEMENTS--PROCEDURES FOR PREPARATION.
Office of Saline Water, Washington, D.C.
Federal Register, Vol 37, No 8, p 545, January 13, 1972.

Descriptors: *Adoption of practices, *Administrative decisions, *Administrative agencies, Environment, Comprehensive planning, Management, Project planning, Standards, Federal government, Personnel management, Environmental effects, Feasibility studies, Federal project policy, Projects, Saline water.
Identifiers: *Environmental Impact Statement, *National Environmental Policy Act.

Procedures are issued to enable the Office of Saline Water to fully discharge its responsibilities in compliance with the National Environmental Policy Act. All cases, activities and contractual interests of OSW having significant environmental impact, which have not been previously described or have been inadequately described, shall require an environmental statement. Statements should include needed inputs for specific statements on projects and activities, evaluation of available data, and evaluation of technical comments and recommendations. Responsibilities of the assistant director and staff chiefs and procedures for filing the statements are delineated. At the time it is decided to study a specific project, the environmental aspects of the project also will be studied. Relevant technical information developed in the course of the design studies will be included as a necessary part of the environmental statement, and conversely the plant design will be modified to resolve any environmental problems which may appear. (Barnes-Florida)
W74-10011

PHOSPHATE MANUFACTURING POINT SOURCE CATEGORY.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10012

NAVIGABLE WATERS OF STATE OF WEST VIRGINIA--WATER QUALITY STANDARDS--PROPOSED RULES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10013

OCEANS OF THE WORLD: THE LAST FRONTIER; AN ANNOTATED INTRODUCTORY BIBLIOGRAPHY ON THE LAW OF THE SEA,
Massachusetts Inst. of Tech., Cambridge. Sea Grant Program.
Report No MITSG 74-17, March 14, 1974. B. Hurd and B. Passero, compilers. 11 p.

Descriptors: *Bibliographies, *Oceans, *International law, *Law of the sea, *International waters, Natural resources, Fish, Mineralogy, Oil, Water pollution, Water pollution sources, Transportation, Water law, Legal aspects, Coasts, Continental shelf, Jurisdiction, Research and development, Marine biology, Grants.
Identifiers: Territorial waters.

As nations' interest in the use of the ocean's resources grows, so do the conflicts resulting from competition for fish, minerals and petroleum, and the problems of pollution, transportation and jurisdiction. In every region of the sea, whether open ocean, continental shelf or coastal zones, legal problems proliferate with the increasing contacts of nations. Thus the international law of the sea has become a complex and sophisticated subject with many problems unresolved and with its full implications as yet unexplored. This annotated bibliography serves as a beginner's guide to the law of the sea. Legal documents have not been included, although some government bodies are listed which are concerned with maritime law. Contents include an introduction to the law of the sea, areas of the ocean, living resources, non-living resources, pollution problems of the sea, regional interests and law of the sea, transportation on the seas and research and ocean law. (Ritchie-Florida)
W74-10055

BIG CYPRESS NATIONAL FRESH WATER RESERVE.
Sen. Bill No 920, 93d Cong, 1st Sess (1973). 6 p.

Descriptors: *Legislation, *Florida, *Watersheds(Basins), *Watershed management(Applied), *Water supply, Water quality, Water requirements, Water law, Water resources, Estuaries, Water resources development, Forest management, Freshwater fisheries, Wetlands, Water shortage, Water sources, Recreation, Land use, Government finance, Interagency cooperation, Ecology, Environmental effects, Conservation.

This bill authorizes the acquisition of the Big Cypress National Fresh Water Reserve in the State of Florida. The unique natural environment of the Big Cypress area of southwestern Florida should be protected from further development which would significantly and adversely affect it ecology. The Big Cypress is a fragile area, and the continued viability of Everglades National Park and certain of the estuarine fisheries of South Florida are directly dependent upon fresh water of adequate quality and volume from the Big Cypress area. In order to effectuate the purpose of this Act, the Secretary of the Interior is authorized to acquire lands, waters and interests therein within the Big Cypress area. However, the boundaries of the area may not encompass more than 522,000 acres of privately owned land. Owners of lands so acquired shall have the right to restricted use of that land for a specified period of time. The Secretary may enter into agreements with Florida or any political subdivision thereof to administer the property acquired persuant to this Act. (Ritchie-Florida)
W74-10056

NEW RIVER AS A POTENTIAL COMPONENT OF THE NATIONAL WILD AND SCENIC RIVERS SYSTEM,
H.R. Bill No 12836, 93d Cong, 2d Sess (1974).

Descriptors: *Wild River Act, *Rivers, *Wild rivers, *Legislation, *Conservation, *Scenery, Aesthetics, Environment, Water policy, Water law, Federal government, Interstate rivers, Virginia, West Virginia, North Carolina, Headwaters, Surface waters, Inland waterways, Natural resources, Resources development, River basin development.
Identifiers: *New River(Va.-W.Va.-N.C.).

This bill would amend the Wild and Scenic Rivers Act of 1968 by designating segments of the New River as a potential component of the National Wild and Scenic Rivers System. The New River is contained within the states of North Carolina, Virginia and West Virginia. The portion to be included is the segment from the headwaters of the North Fork near Tamatuck, North Carolina and the headwaters of the South Fork near Boone, North Carolina to a point on the Main New River near Galax, Virginia. Also to be included is the segment from Sandstone Falls near Sandstone, West Virginia to Hawks Nest State Park, West Virginia. The provisions of the Wild and Scenic Rivers Act shall be applicable to those segments of the New River designated in this Act, except that the time period of such provisions shall be deemed to relate to the date of enactment of this Act insofar as such provisions are applicable to the designated segments. (Ritchie-Florida)
W74-10057

STRATEGIES IN WATER QUALITY CONTROL,
North Carolina Univ., Chapel Hill. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W74-10058

POTABLE WATER--QUALITY GOALS,
For primary bibliographic entry see Field 5G.
W74-10059

WATER POLLUTION PREVENTION AND CONTROL--LIST OF TOXIC POLLUTANTS,
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10060

OUTER CONTINENTAL SHELF OFF FLORIDA--POSSIBLE OIL AND GAS LEASING.
Department of the Interior, Washington, D.C.
Federal Register, Vol 38, No 131, p 18390, July 10, 1973.

Descriptors: *Oil industry, *Federal government, *Planning, *Water pollution sources, Offshore platforms, *Florida, Mississippi, Alabama, Oily wastes, Environmental sanitation, Ecology, Economic aspects, Adoption of practices, Administrative agencies, Environmental effects, Engineering structures, Oil, Coastal structures, Project planning, Water quality control.
Identifiers: *Administrative regulations, *Coastal waters, Environmental impact statement(EIS), National Environmental Policy Act(NEPA).

A draft of an environmental impact statement concerning oil and gas leasing under the Outer Continental Shelf Lands Act is being prepared. The tracts lie seaward of Mississippi, Alabama, and Florida. Two of the tracts off the coast of Florida are near a Department of Defense air test and training site. The density of rigs or platforms in this area must be limited. Views of interested parties are requested on the technological, economic and environmental aspects of this proposal. There is a question as to whether there can be efficient development of oil and gas deposits by techniques presently available. It is also desired to calculate how many years after the issuance of a lease will initial production be achieved. A determination is needed of the comparative costs of exploration, development and production with varying densities of oil drilling equipment. Limitations on the size of surface structures are also proposed. (Sperling-Florida)
W74-10061

PROTECTION OF NATIONS WETLANDS--POLICY STATEMENT.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10062

LIABILITY LIMITS FOR SMALL ONSHORE OIL STORAGE FACILITIES--PROPOSED RULES.
Environmental Protection Agency, Washington, D.C.
Federal Register, Vol 38, No 90, p 12339-12340, May 10, 1973.

Descriptors: *Oil, *Oil pollution, *Federal Water Pollution Control Act, *Water pollution sources, *Pollution abatement, Water pollution control, Penalties(Legal), Legislation, Regulation, Environmental effects, Negligence, Oil reservoirs, Oil industry, Water pollution, Federal government, Storage.
Identifiers: Administrative regulations.

The Administrator of the Environmental Protection Agency, pursuant to authority granted him by the Federal Water Pollution Control Act (FWPCA), as amended, has established size classifications and associated liability limits for small onshore oil storage facilities with fixed capacity of 1,000 bbl or less. When a discharge to the waters of the United States occurs from such facilities and when removal of said discharge is performed by the United States government pursuant to the provisions of the FWPCA, the liability of the owner or operator of the facility shall be limited. Four classes of aboveground storage facilities have liability limits ranging from $4,000 to $200,000 depending on capacity of the facility. In addition, there are four classes of belowground storage facilities with liability limits ranging from $5,200 to $260,000, likewise depending upon capacity of the facility. These limitations shall apply in the absence of willful negligence or willful misconduct within the privity and knowledge of the owner or operator. Definitions of various terms as used in this subpart are included within the regulation. (Ritchie-Florida)
W74-10063

SAVING A DYING SEA. THE LONDON CONVENTION ON OCEAN DUMPING,
M. S. Schenker.
Cornell International Law Journal, Vol 7, No 1, p 32-48, Dec 1973. 96 ref.

Descriptors: *International law, *Treaties, *Oceans, *Water pollution, *International waters, Pollutants, Water pollution sources, Legal aspects, Law of the sea, Oil, Oil pollution, Jurisdiction, Marine biology, Natural resources, Environmental effects, Water pollution control, Water quality, Water quality control, Ships, Waste disposal, Permits, Oil spills.
Identifiers: Territorial waters.

The international community has made several attempts, culminating in the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, to control the intentional discharge of objectionable materials into international waters. The problems which have been encountered include those related to the adequacy of the definition of objectionable materials; the suitability of enforcement provisions, including who can enforce an agreement and before what tribunal enforcement will occur; and the adequacy of the available remedies. Apparently spurred by events such as the Torrey Canyon disaster, recent international agreements have continued to emphasize the problems of oil pollution, and have thus continued to ignore the need to define and control the other objectionable materials which are endangering the oceans. Current treaties thus do not provide adequate protection, because only oil pollution is covered and there is no right of action prior to an accident. Another defect in current treaties is that enforcement has been exclusively within the control of the flag state, and has been based on the use of national court systems. (Ritchie-Florida)
W74-10065

SECTION 10 OF THE RIVERS AND HARBORS ACT: THE EMERGENCE OF A NEW PROTECTION FOR TIDAL MARSHES,
J. M. Kramon.
Maryland Law Review, Vol 33, No 3, p 229-264, 1973. 146 ref.

Descriptors: *Rivers and Harbors Act, *Estuaries, *Estuarine environment, *Saline water-freshwater interfaces, *Coastal marshes, Intertidal areas, Inlets(Waterways), Aquatic habitats, Non-structural alternatives, Legislation, Legal aspects, Regulation, Comprehensive planning, Management, Tidal marshes, Wetlands, Marshes, Coastal plains, Coasts, Judicial decisions.
Identifiers: Coastal zone management.

The growing demand for the use of coastal lands and an increasing awareness of the significance and vulnerability of estuarine areas has created a surge of interest in Section 10 of the Rivers and Harbors Act of 1899. Three recent developments have encouraged the use of Section 10 in the preservation of marshlands: judicial recognition of the broad coverage of Section 10; expansion of the scope of inquiry triggered by an application for a Section 10 permit to include factors other than those affecting navigation; and enlargement of the remedies available to a court upon a finding of a violation of Section 10. These developments as they apply to tidal marshes and the need for their protection is also examined. Eay cases suggested the broad definition of the term 'navigable' which is now enabling courts to find marshland areas within the scope of Section 10. An examination of the equitable remedies available to enforce violations of Section 10 is included. (Craig-Florida)
W74-10066

THE PATRIMONIAL SEA,
London School of Economics and Political Science (England).
L. D. M. Nelson.
International and Comparative Law Quarterly, Vol 22, No 4, p 668-686, October 1973. 96 ref.

Descriptors: *Law of the sea, *International waters, *Commercial fishing, *Jurisdiction, United States, Legal aspects, Natural resources, Conservation, Adoption of practices, Governments, Foreign waters, Fish harvest, Wildlife conservation, Water resources development, Water law, Navigation oceans, Continental shelf, Marine geology, Water resources, Administration, Admiralty, International law, Boundary disputes, Coasts.
Identifiers: *Coastal waters, *Coastal zone management.

The patrimonial sea is an economic zone not more than two hundred miles from the base line of the territorial sea. In it there will be freedom of navigation and overflight, but within the zone the coastal state will have an exclusive right to all resources. This law of the sea concept is a result of the conflict of interests between coastal states and nations possessing distant-water fishing fleets. The main marine resources are located in areas adjacent to coastal states. Such resources are not inexhaustible. Proponents of the notion of the patrimonial sea see it as a compromise between the norms of the classical international law of the sea and demands by coastal states. In 1945 the President of the United States issued proclamations providing for the exercise of jurisdiction over the natural resources of the seabed of the continental shelf. Jurisdiction was also provided over coastal fisheries in certain areas of the high seas. Some Latin American countries have claimed sovereignty over the continental shelf itself, and also to the waters above the shelf, known as the 'epicontinental sea'. (Sperling-Florida)
W74-10067

INDIAN LAW--STATE REGULATION--HUNTING AND FISHING RIGHTS.
New York Law Forum, Vol 18, No 2, p 442-450, Fall 1972. 43 ref.

Descriptors: *Indian reservations, *Judicial decisions, *Federal jurisdiction, *Fishing, Administration, Federal reservations, Federal government, Conservation, Public lands, Adoption of practices, State jurisdiction, Hunting, Wildlife, Water utilization, Legislation, Legal aspects, Water law, Water rights, Water resources, Land use, Land management, Land tenure, Regulation.

State regulation of hunting and fishing on Indian Reservations is discussed. In a recent decision a federal district court held that the State of Minnesota could not enforce its game and fish laws against members of a tribe who used the public lands of the Reservation. The court did not sat tribal hunting and fishing were to be exclusively regulated by the tribe, but reserved ultimate jurisdiction for the federal courts. The tribal right to hunt and fish on reservation land free from interference is generally recognized. Treaty rights of the Indian survived subsequent legislation. It is well established principle that a federal treaty is not to be casually abrogated. Legislation passed in 1953 made explicit the preservation of tribal hunting and fishing rights despite the transfer of federal jurisdiction to the states. Courts have used this legislation to establish intent of other legislation passed a half-century before. If justice is to be done to Indian rights it should be done with careful analysis, one that is not prey to a changing national mood. (Sperling-Florida)
W74-10068

ACQUISITION OF INFORMATION FROM OWNERS AND OPERATORS OF POINT SOURCES SUBJECT TO NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10069

TRANSPORTATION FOR DUMPING AND DUMPING OF MATERIAL INTO OCEAN WATERS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10070

STATE CONTINUING PLANNING PROCESS--NOTICE OF INTERIM REGULATIONS.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10071

EPA'S RUCKELSHAUS: 'FROM CARELESS INDIFFERENCE TO REMEDIAL ACTION',
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5D.
W74-10072

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM--PROPOSED FORMS AND GUIDELINES ACQUISITION OF INFORMATION FROM OWNERS AND OPERATORS OF POINT SOURCES.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10073

WATER BANK PROGRAM--PROPOSED RULES AND REGULATIONS.
Agricultural Stabilization and Conservation Service, Washington, D.C.
Federal Register, Vol 37, No 216, p 23729, November 8, 1972.

Descriptors: *Regulation, *Legislation, *Water, *Conservation, *Water conservation, Water resources, Water resources development, Water management(Applied), Water law, Water policy, Water supply, Water utilization, Planning, Watershed management, Federal government, Dependable supply, Farms, Wetlands, Surface waters, Drainage, Land management.
Identifiers: *Administrative regulations, *Water bank program.

Notice is given of a proposal to amend the regulations governing the Water Bank Program as authorized by the Water Bank Act. If the amendment is adopted a farm will be eligible for par-

ticipation in the program if land on the farm is not already covered by a Water Bank Program agreement. In addition the farm must contain specific types of wetlands which are identified in a conservation plan developed in cooperation with the Soil and Water Conservation District in which the farm is located. These types of wetlands which are common to more than one farm are eligible for designation if the farm which controls the potential outlet for drainage of the common wetlands is placed under agreement. No crop shall be harvested from the designated acreage and such acreage shall not be grazed except as may be called for in the conservation plan. The agreement period shall be ten years, and shall become effective on January 1 of the year in which the agreement is approved. The program will be applicable in states and counties designated by the Deputy Administrator of the Agricultural Stabilization and Conservation Service. (Ritchie-Florida)
W74-10074

PUBLIC USE OF WATER RESOURCE DEVELOPMENT PROJECTS--PROPOSED RULES AND REGULATIONS.
Corps of Engineers, Washington, D.C.
Federal Register, Vol 37, No 184, p 19632-19634, September 21, 1972.

Descriptors: *Regulation, *Water resources, *Water resources development, *Federal government, *Federal project policy, Projects, Water policy, Recreation, Permits, Public rights, Public lands, Camping, Swimming, Hunting, Fishing, Natural resources, Multiple purpose projects, Recreation facilities, Social aspects, Water utilization.
Identifiers: *Administrative regulation.

It is the policy of the Secretary of the Army acting through the Chief of Engineers to provide the public with safe and healthful recreational opportunities within the geographical boundaries of all water resource development projects administered by the Chief of Engineers. To this end, the regulations govern the operation of motor vehicles, vessels and aircraft within such areas. Each District Engineer is given authority to regulate swimming, picnicking, camping, hunting, fishing and trapping. Disposal of refuse or litter into any federally owned waters administered by the Chief of Engineers is prohibited. The District Engineer is empowered to regulate fires, fuels, pets, explosives and firearms within the project areas. He is also authorized to sell or dispose of any lost, abandoned or unclaimed personal property that comes into his custody. A permit is required within the project area for any advertisement, structure, special recreational events or occupation of any lands within the project boundaries. Permits for floating structures shall be obtained pursuant to these regulations. Those for non-floating structures, or those placed in navigable waters shall be obtained pursuant to the Rivers and Harbors Act. (Ritchie-Florida)
W74-10075

ESPECIALLY HAZARDOUS CONDITIONS--PROPOSED RULES.
Coast Guard, Washington, D.C.
Federal Register, Vol 38, No 49, p 6902, March 14, 1973.

Descriptors: *Coast Guard regulations, *Boating regulations, *Boating, *Tides, *Tidal effects, Legal aspects, Water circulation, Tidal streams, Tidal waters, Shores, Ocean waves, Ocean currents, Currents(Water), Intertidal areas, Outdoor recreation, Regulation, Boats, Water sports, Recreation, Seaworthiness.
Identifiers: Administrative regulations.

The Coast Guard is considering issuing regulations to provide for the termination of use of recreational vessels during especially hazardous conditions on certain river bars and coastal inlets along the Pacific coastline of Washington and Oregon. Section 13 of the Federal Boat Safety Act of 1971 provides certain conditions under which a Coast Guard boarding officer, if he feels an especially hazardous condition exists, may direct a boat operator to take necessary steps for the safety of those aboard the vessel. The proposed rule will define additional unsafe conditions for recreational boats being used in certain areas along the coastlines of Washington and Oregon. These areas have certain characteristics which make them especially hazardous to navigation. Ebbing tidal currents of rivers clash with the landward moving waves in shallow bar areas, creating a very heavy, turbulent sea. These conditions occur without warning and have produced a high number of drownings. The proposed regulations define a wave height of four feet or greater in a 'Regulated Recreational Boating Area' as an unsafe condition. (Craig-Florida)
W74-10076

NAVIGATION AND NAVIGABLE WATERS--MARINE INFORMATION.
Coast Guard, Washington, D.C.
Federal Register, Vol 37, No 103, p 10669-10670, May 26, 1972.

Descriptors: *Regulation, *Coast Guard regulations, *Navigation, *Navigable waters, Federal government, Administrative agencies, Boating regulations, Ice, Ships.
Identifiers: Navigation obstructions.

The purpose of these amendments is to change the marine information regulations to conform to present practices. The marine information regulations describe the various publications that the Coast Guard uses to provide information for mariners that pertains to the safety of navigation. Since these regulations are descriptions of publications that the Coast Guard uses to inform the public and relate to agency practice, they are exempted from public rule making procedures. The Coast Guard issues information concerning the establishment of aids to maritime navigation and the changes, discontinuances, and deficiencies of aids to maritime navigation maintained and operated by or under the authority of the Coast Guard in documents and marine broadcasts having the general title of 'Notice to Mariners'. This subpart describes those publications and the marine broadcasts. (Ritchie-Florida)
W74-10077

HEAVY WATER--INCREASE IN PRICE.
Atomic Energy Commission, Washington, D.C.
Federal Register, Vol 37, No 49, p 5266, March 11, 1972.

Descriptors: *United States, *Water supply, *Economic aspects, *Nuclear engineering, *Heavy water, Deuterium, Water sources, Water requirements, Administrative agencies, Administration, Adoption of practices, Contract administration, Pricing, Prices.
Identifiers: *Administrative regulations.

The United States Atomic Energy Commission announced an increase in the sale price and in the base charge for heavy water from thirty dollars to thirty-nine dollars per pound. The base charge is the figure used in leasing arrangements by the Commission in applying its annual use-charge rate to the value of the material. In view of the limited United States production capacity, the Commission has not attempted to meet worldwide long-term requirements for this material as it has for enriched uranium. However, to the extent heavy water is available in excess of the needs of Commission sponsored programs, the Commission will contract to supply heavy water for peaceful purposes to domestic and overseas customers on a first-come first-served basis. (Sperling-Florida)
W74-10078

DEFINITION OF NAVIGABLE WATERS OF UNITED STATES--ADMINISTRATIVE PROCEDURE.
Corps of Engineers, Washington, D.C.
Federal Register, Vol 37, No 176, p 18289-18292, Sept. 9, 1972.

Descriptors: *Navigable waters, *Navigation, *Regulation, *Administrative agencies, *Bodies of water, Judicial decisions, Water law, Legal aspects, Water resources, Water resources development, Water policy, Structures, Water utilization, Interstate, Foreign waters, Rivers, Oceans, Continental shelf, Flow, High water mark, Federal government.
Identifiers: Navigability tests.

This amendment includes a more complete discussion and legal analysis of the definition of navigable waters of the United States. That definition is dependent on doctrines established by federal courts, and must therefore periodically be revised to reflect changes in the law. The amendment also reflects the administrative need for a more definitive and explanatory definition as increased and competing demands are made on the nation's water resources. Navigable waters are thus defined as those waters which are presently, or have been in the past, or may be in the future, susceptible for purposes of interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the body of water and is not extinguished by later actions or events which impede or destroy navigable capacity. Determinations are not limited to the natural or original condition of the water body. Navigability may also be found where artificial aids have been or may be used to make the water body more suitable for use in navigation. (Ritchie-Florida)
W74-10079

A CASE STUDY IN INTERSTATE RESOURCE MANAGEMENT: THE CALIFORNIA-NEVADA WATER CONTROVERSY, 1955-1968,
California Univ., Davis. Dept. of History.
W. T. Jackson, and D. J. Pisani.
Available National Technical Information Service as PB-234 015, $4.00 in paper copy, $1.45 in microfiche. California Water Resources Center, Davis. Contribution No 147, May, 1974. 70 p, 4 fig, append. OWRR A-046-CAL(2). UCAL-WRC-W-380.

Descriptors: *Federal-state water rights conflicts, Negotiations, *Interstate compacts, *History, Management, *Water policy, *California, *Nevada, *Interstate commission, Water demands, *Water utilization, Priorities, Alternative water use.
Identifiers: *Lake Tahoe(Calif-Nev), Carson River, Tuckee River, Walker River.

A history is presented of the California-Nevada Interstate Compact Commission from its formation in 1955 through 1971. The commission was responsible for drafting a compact dividing up the surplus water of one interstate lake, Lake Tahoe, and three interstate streams, the Truckee, Carson and Walker rivers. However, largely because of opposition from the federal government, the compact has never taken effect. Federal agencies interested in Lake Tahoe, particularly the Department of the Interior, have blocked any chance for the two states to solve their mutual water problems by imposing a new set of negotiating conditions on the commissioners after a formal compact between the states was adopted. Much of the criticism levelled at the compact commission has been unjustified considering the statutory limitations imposed on the commission's authority when negotiations began. Finally, this report illustrates the continuing conflict over water use priorities in the American West. Throughout negotiations the relative value of water use for recreation was tested against the needs of farmers, power companies and other interest groups. The agree-

ments reached by negotiators reflect the difficulty water use planners have had in reconciling conflicting, and often inconsistent, demand on a limited resource.
W74-10083

THE STATES ENTER THE RURAL WATER PICTURE,
Conset, Inc., Washington, D.C.
M. E. Morgan.
Water Well Journal, Vol 28, No 2, p 34-38, February, 1974.

Descriptors: *Management, *Economics, Rural areas, Federal budget, *New Mexico.
Identifiers: *Rural water systems, *Grant and loan programs, Financial assistance.

The state of New Mexico has one of the oldest and most beneficial grant and loan programs for water supply facilities. The New Mexico project, established as one of National Demonstration Water Project (NDWP) affiliates in 1972, represents NDWP's first statewide effort and is the only affiliate to receive technical assistance, cash grants, and a full-time staff from a state agency. The cut-back in federal aid to rural areas may prompt more states to follow New Mexico's example. Questionnaires sent to all fifty states show that only three states of 20 that have responded are planning to establish grant and loan programs for water supply systems. (Campbell-NWWA)
W74-10106

SEWAGE TREATMENT METHODS IN FINLAND,
National Water Board of Finland, Helsinki. Research Inst.
For primary bibliographic entry see Field 5D.
W74-10162

WATER LAW IN RELATION TO ENVIRONMENTAL QUALITY,
Organization: Colorado State Univ., Fort Collins. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W74-10202

MAN AND HIS ENVIRONMENT,
For primary bibliographic entry see Field 6G.
W74-10242

WATER MANAGEMENT AT ITS BEST.
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 6B.
W74-10271

COMPARATIVE ASPECTS OF COASTAL ZONE MANAGEMENT: BACKGROUND INFORMATION ON THE LAW OF TEXAS AND OTHER STATES IN VIEW OF THE COASTAL ZONE MANAGEMENT ACT OF 1972.
Texas Law Inst. of Coastal and Marine Resources, Houston.
1973, 34 p, 8 append.

Descriptors: *Texas, *Coastal plains, *Coastal areas, *Shore protection, *Shores, *Estuarine environment, Beaches, Coasts, Seashores, Coastal marshes, Water management, Wetlands, Conservation, Management, Land management, Environment.
Identifiers: Coastal zone management.

In 1961, the Texas legislature passed the Reagan-De La Garza Act, declaring a state policy to protect the natural resources in the coastal zone, whether publicly or privately owned. The act was never funded, however, and was repealed on the passage of The Coastal Public Lands Management Act, which concerns only the management of publicly-owned coastal lands. One recommendation is that Texas should vest all coastal management activities in one governmental body, and should provide the following: better overall planning and co-ordination; enforcement of permits and regulations; a system of checks, balances, and veto powers; a review of process outside of the court system; and assurance of participation in, and implementation of the federal coastal zone management program. Efforts of other states in coastal zone management are compared, and three major types of programs are compared: a permit system, an acquisition program to buy up threatened areas, and a system of issuing protective or restrictive orders to limit use. A model approach should employ all three types. (Perrey-Florida)
W74-10272

PROGRESS IN THE RURAL WATER PROGRAMS OF LATIN AMERICA (LOS PROGRAMAS DE ABASTECIMIENTO RURAL DE AQUA DE AMERICA LATINA),
D. Donaldson.
Boletin De La Oficina Sanitaria Panamericana, Vol 76, No 4, p 281-299, April 1974. 2 fig, 6 tab, 18 ref. (English summary).

Descriptors: *Water supply, *Rural areas, *Potable water, Costs, Administration, Financing, *Public health, *South America.
Identifiers: *Latin America.

Rural water supply problems in Latin America have been receiving growing attention. In 1971 about 27 percent of Latin American rural dwellers had potable water, about four times as many as in 1961. However, new goals for 1980 have been established by the Ministers of Health of the Americas. This involves reviewing kinds of rural water systems to be installed, administrative and financial structure of the program, and new approach methods. Past programs have concentrated on the rural villages, have used 'revolving' funds for internal financing, and have tried mass approach concepts. Local participation is necessary to any future success. (Prague-FIRL)
W74-10279

6F. Nonstructural Alternatives

FLOODS FROM SMALL DRAINAGE AREAS IN CALIFORNIA--A COMPILATION OF PEAK DATA, OCTOBER 1958 TO SEPTEMBER 1973,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4A.
W74-09940

FLOOD PLAIN INFORMATION, OHIO RIVER: MONROE COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09965

FLOOD PLAIN INFORMATION, OHIO RIVER: JEFFERSON COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09966

FLOOD PLAIN INFORMATION, MONONGAHELA RIVER: NORTH CHARLEROI, CHARLEROI, SPEERS, DUNLEVY, ALLENPORT, STOCKDALE, ROSCOE, AND ELCO, WASHINGTON COUNTY, PENNSYLVANIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09967

FLOOD PLAIN INFORMATION, OHIO RIVER: BELMONT COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09968

FLOOD PLAIN INFORMATION, OHIO RIVER: WETZEL COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09969

FLOOD PLAIN INFORMATION, OHIO RIVER: MARSHALL COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09970

FLOOD PLAIN INFORMATION, OHIO RIVER: HANCOCK COUNTY, WEST VIRGINIA.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09971

FLOOD PLAIN INFORMATION, OHIO RIVER: COLUMBIANA COUNTY, OHIO.
Army Engineer District, Pittsburgh, Pa.
For primary bibliographic entry see Field 4A.
W74-09972

A PROPOSED OPEN BEACHES STATUTE FOR FLORIDA,
Miami Univ., Fla. Ocean Law Program.
For primary bibliographic entry see Field 2J.
W74-09977

A BILL TO EXPAND THE NATIONAL FLOOD INSURANCE PROGRAM BY SUBSTANTIALLY INCREASING LIMITS OF COVERAGE AND TOTAL AMOUNT OF INSURANCE AUTHORIZED TO BE OUTSTANDING AND BY REQUIRING KNOWN FLOOD-PRINE COMMUNITIES TO PARTICI PATE IN THE PROGRAM, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W74-09985

FLOODING PROBLEMS ASSOCIATED WITH CURRENT HIGH LEVELS OF THE GREAT LAKES.
Michigan Dept. of Natural Resources, Lansing. Water Development Services Div.
For primary bibliographic entry see Field 2H.
W74-09994

A METHODOLOGY FOR PLANNING LAND USE AND ENGINEERING ALTERNATIVES FOR FLOODPLAIN MANAGEMENT,
Arizona Univ., Tucson. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4A.
W74-10277

6G. Ecologic Impact Of Water Development

ENVIRONMENTAL MONITORING AT MAJOR U.S. ATOMIC ENERGY COMMISSION CONTRACTOR SITES, CALENDAR YEAR 1972.
Division of Operational Safety (AEC), Washington, D.C.
For primary bibliographic entry see Field 5A.
W74-09840

STATISTICAL TESTS OF LEOPOLD'S SYSTEM FOR QUANTIFYING AESTHETIC FACTORS AMONG RIVERS,
Calgary Univ. (Alberta). Dept. of Geography.
L. Hamill.
Water Resources Research, Vol 10, No 3, p 395-401, June 1974. 2 fig, 5 tab, 7 ref.

Descriptors: *Scenery, *Aesthetics, *Statistical methods, Recreation, Natural resources, Evaluation.
Identifiers: *Environmental impact.

Techniques by Leopold for comparing aesthetic factors among rivers, which include uniqueness ratios and graphic derivations of scale of river character and scale of valley character are evaluated statistically. Summary measures of attractiveness were calculated by adding evaluation numbers or ratings. Leopold's methods were tested by using the Spearman rank correlation coefficient to compare rankings. There was poor correlation between evaluation numbers and uniqueness ratios for physical and water quality factors. Correlation was better for human use and scenic factors. The meaning of additive evaluation numbers is more comprehensible than the meaning of additive uniqueness ratios; the additive uniqueness ratios were concluded to be less efficient. The graphic procedures introduce anomalies in combining two or more sets of factors, and the addition of evaluation numbers was concluded to be more reliable. The addition of evaluation numbers requires less time and effort than the procedures advocated by Leopold and is less subject to errors. (Knapp-USGS)
W74-09913

ENVIRONMENTAL STATEMENTS--PROCEDURES FOR PREPARATION.
Office of Saline Water, Washington, D.C.
For primary bibliographic entry see Field 6E.
W74-10011

BIG CYPRESS NATIONAL FRESH WATER RESERVE.
For primary bibliographic entry see Field 6E.
W74-10056

NEW RIVER AS A POTENTIAL COMPONENT OF THE NATIONAL WILD AND SCENIC RIVERS SYSTEM,
For primary bibliographic entry see Field 6E.
W74-10057

THE PLANNING OF A CORPS OF ENGINEERS RESERVOIR PROJECT: LAW, ECONOMICS AND POLITICS,
Illinois Univ., Urbana.
For primary bibliographic entry see Field 6B.
W74-10064

SECTION 10 OF THE RIVERS AND HARBORS ACT: THE EMERGENCE OF A NEW PROTECTION FOR TIDAL MARSHES,
For primary bibliographic entry see Field 6E.
W74-10066

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CONSTRUCTION OF MILLSTONE NUCLEAR POWER STATION, UNIT 3, MILLSTONE POINT COMPANY, ET. AL.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-10109

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF RANCHO SECO NUCLEAR GENERATING STATION UNIT 1, SACRAMENTO MUNICIPAL UTILITY DISTRICT.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W74-10110

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2, TENNESSE VALLEY AUTHORITY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5C.
W74-10111

DECOMMISSIONING OF NUCLEAR FACILITIES - A BIBLIOGRAPHY.
Office of Information Services (AEC), Oak Ridge, Tenn.
Available from NTIS, Springfield, Va., as Rept. No. TID-3344; $4.00/copy, $1.45/microfiche. Report No. TID-3344, April 1974. 13 p.

Descriptors: *Bibliographies, *Nuclear energy, Facilities, Equipment, *Nuclear powerplants, *Nuclear reactors, Research and development, Chemical reactions, Fuels, Radioactivity.
Identifiers: *Decommissioning, *Decontamination, Decontaminating agents.

A bibliography contains 108 references which deal with the decommissioning, retirement, or dismantling of various nuclear facilities. The references were selected from Nuclear Science abstracts, and are arranged chronologically by NSA volume and abstract number. (Houser-ORNL)
W74-10119

WATER RESOURCE DEVELOPMENT AND ENVIRONMENT - AN APPROACH TO IMPACT ANALYSIS,
Waterloo Univ. (Ontario). Div. of Environmental Studies.
D. W. Fischer, and G. R. Francis.
International Journal of Environmental Studies, Vol 5, p 299-305, 1974. 40 ref, 3 append.

Descriptors: *Environment, *Environmental effects, *Water resources, *Management, *Administration, Evaluation, Assessment, Analysis.
Identifiers: Impacts identification, Base assessment, Impact assessment.

Environmental impacts of water development projects are becoming a major problem to water managers. Environmentalists have caused such projects to be delayed and even cancelled after considerable time and effort have been expanded. A set of principles to incorporate environmental considerations into water management decisions is suggested. These principles are then applied via consultations and an impact analysis consisting of three parts: identification of environmental units, assessment of the environmental base, and assessment of the environmental impacts. (Houser-ORNL)
W74-10122

WATER LAW IN RELATION TO ENVIRONMENTAL QUALITY,
Organization: Colorado State Univ., Fort Collins. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W74-10202

MAN AND HIS ENVIRONMENT,
Available from NTIS, Springfield, Va 22151 JPRS 59369 Price $3.00 printed copy; $1.45 microfiche. Joint Publications Research Service Report No 59369, June 27, 1973. 45 p, 1 tab. (Translated from Voprosy Filosofii, No 1-2, Moscow, 1973).

Descriptors: *Conferences, *Ecology, *Environment, Social aspects, Political aspects.
Identifiers: *USSR.

In November 1972 the magazine Voprosy Filosofii (USSR) held a roundtable meeting of scholars. The subject of the meeting was 'Man and His Environment.' Consideration of problems of the ecology of man was concentrated on such questions as society and ecology and social aspects of the ecological problems; factors causing the ecological crisis; the relationship of social, cultural, and technical aspects of ecological problems; tasks and ways of humanizing the relationship between man, nature, and society; the relationships between the scientific and technical, the social, and the ecological revolution; ideological and sociopolitical problems of ecology and the features of their resolution under socialism and capitalism; philosophical and cultural aspects--historical precedents and ways of resolving ecological problems; natural scientific principles of the ecological problems; ways of developing modern science and reconciling ecological contradictions; problems of the biological nature of man and factors of man's adaptation of the changing ecological conditions of his existence; and the ideological struggle with problems of man's ecology in the world. (Knapp-USGS)
W74-10242

7. RESOURCES DATA

7A. Network Design

DEVICE FOR AUTOMATIC REMOTE DATA COLLECTION (DARDC),
National Weather Service, Silver Spring, Md. Engineering Div.
L. J. Boezi.
Available from NTIS, Springfield, Va 22151 as COM-73-11417 Price $3.50 printed copy; $1.45 microfiche. National Oceanic and Atmospheric Administration Technical Memorandum NWS-ENG-9, March 1973. 26 p, 3 fig, append.

Descriptors: *Data collections, *Telemetry, *Automation, *Instrumentation, Equipment, Hydrologic data, Meteorological data, Gaging stations, Data transmission, Remote control.

The Device for Automatic Remote Data Collection (DARDC) is a battery-powered responder that can operate at remote unattended sites for periods up to 6 months. When interrogated from a distant station, the DARDC increases its power from a standby state to an operating state, collects data from the hydrological and meteorological instruments connected to it, prepares and transmits a fixed-format, variable-length message to the interrogating station, and then returns itself to a low-power, quiescent state. The DARDC can service from one to four hydrological and meteorological instruments at a time. It establishes an input format for data from hydrological and meteorological instruments and a data transmission code in a form commonly accepted throughout the automatic data processing industry. (Knapp-USGS)
W74-10256

7B. Data Acquition

SURVEY OF REMOTE SENSING APPLICATIONS,
Geological Survey, Reston, Va. Eros Program Office.
M. Deutsch.
Water Well Journal, Vol 28, No 7, p 35-38, July 1974. 5 fig.

Descriptors: *Remote sensing, *Groundwater, *Satellites(Artificial), Infrared radiation, Turbidity, Mapping, Vegetation, Aquifers, Data collections, Hydrologic data.
Identifiers: ERTS.

Data from the first Earth Resources Technology Satellite (ERTS) as well as from NASA and other aircraft, contain much of the information indicative of the distribution of groundwater and the extent of its utilization. Thermal infrared imagery

from aircraft is particularly valuable in studying groundwater discharge to the sea and other surface water bodies. Color infrared photography from aircraft and space is also used to locate areas of potential groundwater development. Anomalies in vegetation, soils, moisture, and their pattern of distribution may be indicative of underlying groundwater conditions. Remote sensing may be used directly or indirectly to identify stream reaches for test holes or production wells. Similarly, location of submarine springs increase effectiveness of groundwater exploration in the coastal zone. (Knapp-USGS)
W74-09899

REGIONAL FLOOD MAPPING FROM SPACE,
National Aeronautics and Space Administration, Greenbelt, Md.
For primary bibliographic entry see Field 7C.
W74-09906

A MODIFIED METHOD OF AERIAL SURVEY OF SHADOWS TO STUDY SNOW COVER (NOVYY VARIANT SPOSOBA AEROFOTOS'YEMKI TENEY DLYA IZUCHENIYA SNEZHNOGO POKROVA),
Gosudarstvennyi Gidrologicheskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2C.
W74-09930

AIRCRAFT MEASUREMENT OF SEA-WAVE PARAMETERS BY THE RADIO-ENGINEERING METHOD (IZMERENIYE PARAMETROV MORSKOGO VOLNENIYA RADIOTEKHNICHESKIM METODOM S LETATEL'NOGO APPARATA),
Taganrogskii Radiotekhnicheskii Institut (USSR).
A. A. Garnaker'yan, K. L. Afanas'yev, V. T. Lobach, and V. V. Timonov.
Meteorologiya i Gidrologiya, No 12, p 102-108, December 1973. 5 fig, 2 tab, 10 ref.

Descriptors: *Ocean waves, *Radio waves, *Aircraft, *Measurement, *Instrumentation, Specifications, Wavelengths, Height, Equations.
Identifiers: USSR.

A radio instrument operating at a meter wavelength range was designed to measure height of sea waves by the ratio of the incoherent component to the coherent component in the echo. Differences between measurements of sea-wave heights by the new instrument and measurements using the GM-16 wave meter do not exceed 10%. The error of measurement of sea-wave heights by the new instrument depends insignificantly on flight altitude and is practically independent of the aircraft's flight speed and direction. The possibility of measuring the length and direction of sea-wave propagation by the spectral width of the echo was demonstrated experimentally in the meter wavelength range. (Josefson-USGS)
W74-09933

TESTING LIQUID SAMPLES.
Vikers Ltd., Melbourne, (Australia).
Australian Patent 444,506. Issued January, 1974. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 2, p 178, January, 1974.

Descriptors: Equipment, *Patents, *Testing, *Liquids, Australia.
Identifiers: Suction.

An apparatus for use in testing samples of liquids is described. It consists of a multi-outlet chamber and a method for producing suction within the chamber. The liquid is drawn through the chamber inlet into the chamber and along the first fluid path until the liquid reaches the first capillary. The level of liquid in the chamber rises while gas is drawn from the chamber via the second fluid path. The chamber is subsequently emptied of liquid by connecting the third fluid path to connect the first outlet to the suction producing means in the chamber bypassing the portion of relatively high resistance of the first path. (Merritt-FIRL)
W74-10032

MEMBRANE FILTER TECHNIQUE FOR ENUMERATION OF PSEUDOMONAS AERUGINOSA,
Environmental Protection Agency, Narragansett, R. I. Northeastern Water Supply Lab.
M. A. Levin, and V. J. Cabelli.
Appl Microbiol. Vol 24 No 6 p 864-870, 1972. Illus.
Identifiers: Enumeration, *Membrane filter technique, *Pseudomonas-Aeruginosa, Sew water, Sewage, *Bioassay.

A membrane filter procedure for the quantitation of P. aeruginosa (mPA procedure) was developed. Through the use of inhibitors and an elevated incubation temperature, the level of background microbial flora was decreased approximately 10,000-fold. Using P. aeruginosa cells suspended in sea water and held for 24 hr, between 70 and 100% of the cells 'viable' could be recovered by the mPA procedure. Assay variability was found to be significant. The recoveries of P. aeruginosa from surface (fresh and salt) waters, potable waters and sewage by the mPA procedure exceeded those obtainable by current methods. Subsequent to its development and evaluation, the mPA procedure was used at 3 other laboratories for the enumeration of P. aeruginosa in potable and recreational waters and in sewage samples. It was found amenable to routine use and confirmation of typical colonies approached 100%.--Copyright 1973, Biological Abstracts, Inc.
W74-10042

THE EFFECT OF A CHEMICAL METHOD FOR GAUGING DISCHARGE ON THE INVERTEBRATES OF A MOUNTAIN RIVER, (IN FRENCH),
Paul Sabatier Univ., Toulouse (France). Lab. of Hydrobiology.
H. Decamps, and J. M. Elliott.
Ann Limnol. Vol 8, No 1, p 217-222, 1972. (English summary).
Identifiers: Discharge(Water), *Invertebrate drift, Methodology, Mountain rivers, Gaging, *Tracers, *Fluorescein tracers, *Dichromate tracers.

Variations in invertebrate drift were studied during the gauging of discharge in a mountain river (constant rate injection method with dichromate during gauging, and fluorescein in the preliminary trial). There was a slight increase in the numbers in the drift when the fluorescein or dichromate was introduced into the river, but this increase was only statistically significant for total numbers, not for individual taxa.--Copyright 1973, Biological Abstracts, Inc.
W74-10048

RESISTIVITY METHODS IN PROSPECTING FOR GROUND WATER,
Kansas State Univ., Manhattan. Dept. of Geology.
For primary bibliographic entry see Field 4B.
W74-10100

TURBULENT DIFFUSION IN LIQUID JETS: PART I, MEASUREMENT OF PARTICLE CONCENTRATION BY A LIGHT SCATTERING PROBE,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
For primary bibliographic entry see Field 5B.
W74-10196

APPLICATION OF POLARIZATION MEASUREMENTS IN TRACING TECHNIQUES,
Rhode Island Univ., Kingston.
For primary bibliographic entry see Field 5B.
W74-10203

SOIL WATER CONTENT: MICROWAVE OVEN METHOD,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 2G.
W74-10206

A CAPILLARY TUBE DIFFUSION CELL FOR MEASURING ION DIFFUSION IN AQUEOUS SOLUTIONS,
Arkansas Univ., Fayetteville. Dept. of Agronomy.
For primary bibliographic entry see Field 5A.
W74-10207

AN ECONOMICAL HYDRAULIC LYSIMETER--CONSTRUCTION AND CALIBRATION,
Jawaharlal Nehru Agricultural Univ., Jabalpur (India). Dept. of Soil Science and Agricultural Chemistry.
For primary bibliographic entry see Field 2G.
W74-10238

AN ERTS VIEW OF ALASKA--REGIONAL ANALYSIS OF EARTH AND WATER RESOURCES BASED ON SATELLITE IMAGERY,
Cold Regions Research and Engineering Lab., Hanover, N.H.
D. M. Anderson, W. K. Crowder, L. W. Gatto, R. K. Haugen, and T. L. Marlar.
Available from NTIS Springfield, Va 22151 as AD-765 442 Price $4.25 printed copy; $1.45 microfiche Technical Report 241, June 1973. 48 p, 36 fig, 3 tab, 36 ref. NASA Contract S-70253-AG.

Descriptors: *Remote sensing, *Alaska, *Satellites(Artificial), Water circulation, Glaciers, *Sedimentation, *Mapping, Geomorphology, Surveys, Data collections, Photogrammetry, Aerial photography, Water resources, Regional analysis, *Permafrost.
Identifiers: *Cook Inlet(Alas), *ERTS satellite.

Satellite imagery was used for synoptic surveys of the distribution and environmental interrelationships of permafrost terrain and of coastal sedimentation and related processes in Cook Inlet, Alaska. Earth Resources Technology Satellite multispectral scanner (MSS) imagery was the primary data source for this investigation. Aerial underflight imagery and ground observations of selected sites were secondary data sources. Emphasis has been placed on evaluating the feasibility of mapping permafrost terrain from textural and tonal patterns related to surficial geology and vegetation. A mosaic of a 153,400-sq km area in north-central Alaska was prepared at a scale of 1:1 million. Seven surficial geology, 8 vegetative cover and 4 permafrost terrain units were defined and delineated. Many geomorphic features were also recognized: thaw lakes, stream drainage patterns, glacial moraines, cirques, abandoned glacial valleys and volcanic cones. The distribution of sediments and regional circulation patterns can be monitored using satellite imagery. (Knapp-USGS)
W74-10251

REFLECTANCE OF VEGETATION, SOIL, AND WATER,
Agricultural Research Service, Weslaco, Tex.
C. L. Wiegand.
Available from NTIS, Springfield, Va 22151 as N74-11165 Price $3.00 printed copy; $1.45 microfiche. Report to NASA, Goddard Space Flight Center, November 1973. 7 p, 1 fig, 1 tab. ERTS-1 GSFC ID AG 339.

Descriptors: *Remote sensing, *Satellites(Artificial), *Vegetation, Soils, Solar radiation, Aerial photography, Data collections, *Texas, Seasonal, Chlorophyll, Crops, Leaves, Canopy, *Reflectance.
Identifiers: *ERTS satellite, Hidalgo County(Tex).

The seasonal changes in reflectance of various soils and of various crops grown in Hidalgo County, Texas, are being studied using ERTS-1, ground, and aircraft spectral data. Discrimination of specific crop and soil conditions is being attempted; chlorophyll content of plant leaves is being correlated with reflectance in the visible channels, and comparisons are being made between ERTS data and predictions from analytical models describing interaction of light with plant canopies. (Knapp-USGS)
W74-10252

PROBLEM OF MEASUREMENT OF SOIL MOISTURE POTENTIAL BY THE CRYOSCOPIC METHOD (K VOPROSU OB IZMERENII POTENTSIALA POCHVENNOY VLAGI KRIOSKOPICHESKIM METODOM),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 2G.
W74-10265

POSSIBILITY OF MAPPING ICE CONDITIONS ON LARGE LAKES FROM SATELLITE IMAGERY (VOZMOZHNOST' KARTIROVANIYA LEDOVOY OBSTANOVKI NA KRUPNYKH OZERAKH PO SNIMKAM S ISKUSSTVENNYKH SPUTNIKOV ZEMLI),
Gosudarstvennyi Gidrologicheski Institut, Leningrad (USSR).
For primary bibliographic entry see Field 2C.
W74-10266

RECORDING WATER USE BY MEANS OF DIGITAL EQUIPMENT,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
L. F. Payne, and H. A. Schreiber.
Agronomy Journal, Vol 64, No 1, p 83-84, January-February, 1972. 1 fig.

Descriptors: *Water utilization, *Measurement, *Hydroponics, Data collections, *Data storage and retrieval, *Water loss, Instrumention, Automation, Data processing.

A device made of digital components is described that automatically (1) senses a discrete loss of water in individual hydroponic cultures: (2) stores this information as identifying numbers in an 8 2-digit word memory; and (3) displays this information on an electric typewriter at 1-minute intervals. As many as 16 readings a day can be obtained in a greenhouse, if the ratio of leaf area to water surface area is high enough. This equipment, then, gives a sensitive measurement of water use related to climatic, genetic, or physiologic treatments. (Skogerboe-Colorado State)
W74-10332

7C. Evaluation, Processing and Publication

APPLICATION OF THE LUNR INVENTORY SYSTEM FOR WATER RESOURCES PLANNING AND MANAGEMENT IN THE SUSQUEHANNA RIVER BASIN,
Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
For primary bibliographic entry see Field 6B.
W74-09807

MODELS AND COMPUTER CODES FOR EVALUATING ENVIRONMENTAL RADIATION DOSES,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5B.
W74-09824

THE TRANSMISSIVITY ITERATIVE PROGRAMS ON THE PDP-9 COMPUTER - A MAN-MACHINE INTERACTIVE SYSTEM,
Battelle-Pacific Northwest Labs., Richland, Wash. Mathematics Dept.
For primary bibliographic entry see Field 2F.
W74-09825

A DATA ACQUISITION SYSTEM FOR TRANSIENT POROUS MEDIA EXPERIMENTS IN A SECTOR TANK,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 2F.
W74-09887

SURVEY OF REMOTE SENSING APPLICATIONS,
Geological Survey, Reston, Va. Eros Program Office.
For primary bibliographic entry see Field 7B.
W74-09899

REGIONAL FLOOD MAPPING FROM SPACE,
National Aeronautics and Space Administration, Greenbelt, Md.
A. Rango, and V. V. Salomonson.
Water Resources Research, Vol 10, No 3, p 473-484, June 1974. 11 fig, 12 ref.

Descriptors: *Mapping, *Floods, *Regional flood, *Satellites(Artificial), *Remote sensing, Flood data, Infrared radiation, Aerial photography, Surveys.
Identifiers: *ERTS.

The Earth Resources Technology Satellite (ERTS 1), launched on July 23, 1972, was used to monitor the extent of inundation of regional floods. The inundated areas exhibit sharply reduced near-infrared reflections caused by standing surface water, excessive soil moisture, and stressed vegetation, which persist up to 10-12 days after the flood peak. The amount of area affected by flooding over regions encompassing many thousands of square kilometers can be mapped definitively at 1:250,000 scale from ERTS 1 imagery in times much shorter than those required by ground-based or aircraft snurveys. The ERTS 1 imagery also permits easy extension of flood mapping to areas not normally covered by more familiar survey methods. In addition to the detection of flood events, ERTS 1 can be used to map flood susceptibility indicators on the floodplain for purposes of delineating flood-prone areas. (Knapp-USGS)
W74-09906

EXPECTED RANGE AND ADJUSTED RANGE OF HYDROLOGIC SEQUENCES,
Pittsburgh Univ., Pa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W74-09908

FLOODS FROM SMALL DRAINAGE AREAS IN CALIFORNIA--A COMPILATION OF PEAK DATA, OCTOBER 1958 TO SEPTEMBER 1973,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 4A.
W74-09940

HYDROLOGIC DATA OF THE NEPONSET AND WEYMOUTH RIVER BASINS, MASSACHUSETTS,
Geological Survey, Boston, Mass.
For primary bibliographic entry see Field 4A.
W74-09945

SIMULATION OF ALLUVIAL FAN DEPOSITION BY A RANDOM WALK MODEL,
Geological Survey, Reston, Va. Water Resources Div.
For primary bibliographic entry see Field 2F.
W74-10054

TEST WELL YIELDS DATA ON HYDROGEOLOGIC PROPERTIES OF SUBSURFACE MATERIALS,
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 4B.
W74-10095

DETERMINING FRACTURE PRESSURE GRADIENTS FROM WELL LOGS,
Schlumberger Well Services, Houston, Tex.
For primary bibliographic entry see Field 8B.
W74-10099

POTENTIAL USES FOR BOREHOLE LOGS IN MINERAL EXPLORATION,
Sproule (J. C.) and Associates Ltd., Calgary (Alberta).
For primary bibliographic entry see Field 8G.
W74-10105

WATER ATLAS OF THE UNITED STATES,
J. J. Geraghty, D. W. Miller, F. Van der Leeden, and F. L. Troise.
Water Information Center, Inc., Port Washington, New York, 1973. 244 p.

Descriptors: Groundwater, Water supply, Water utilization, Water quality, *Water resources, *Water conservation, Water law, Water pollution, *Maps.

A comprehensive, visual guide to the water situation in the United States is presented. This edition contains 122 maps covering subjects related to water resources, water use, water pollution and quality, water conservation, water law and water-based recreation. Maps are also presented for Alaska and Hawaii. Some maps were acquired from governmental and private sources, while others were prepared by the authors. All maps have been modified and drawn on a similar base to facilitate comparisons. A text description accompanies each map and contains facts and statistics that are not shown on the map. All time-dependent information is identified by date. (Staplin-NWWA)
W74-10107

AERIAL RADIOLOGICAL MEASURING SURVEY OF THE AREA SURROUNDING THE MILLSTONE NUCLEAR POWER STATION, WATERFORD, CONNECTICUT, AUGUST 29 AND SEPTEMBER 11, 1969.
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 5A.
W74-10120

GROUND BASED OBSERVATIONS SUPPORTING THE SHIPPINGPORT PENNSYLVANIA, AERIAL RADIATION SURVEY OF FEBRUARY 1973.
EG and G, Inc., Las Vegas, Nev.
For primary bibliographic entry see Field 5A.
W74-10121

PERCOL USER'S MANUAL,
Battelle-Pacific Northwest Lab., Richland, Wash. Water and Land Resource Dept.
For primary bibliographic entry see Field 5B.
W74-10123

WATER RESOURCES OF THE KOMI ASSR AND PROSPECTS OF THEIR USE (VODNYYE RESURSY KOMI ASSR I PERSPECKTIVY IKH ISPOL'ZOVANIYA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 4A.
W74-10230

ESTIMATED RAINFALL FOR DRAINAGE CALCULATIONS IN THE UNITED KINGDOM,
Transport and Road Research Lab., Crowthorne (England).
For primary bibliographic entry see Field 2B.
W74-10241

AN ERTS VIEW OF ALASKA--REGIONAL ANALYSIS OF EARTH AND WATER RESOURCES BASED ON SATELLITE IMAGERY,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 7B.
W74-10251

DEVICE FOR AUTOMATIC REMOTE DATA COLLECTION (DARDC),
National Weather Service, Silver Spring, Md. Engineering Div.
For primary bibliographic entry see Field 7A.
W74-10256

WATER RESOURCES DATA FOR TEXAS, 1973: PART 1. SURFACE-WATER RECORDS.
Geological Survey, Austin, Tex.
Data Report, 1974. 639 p, 1 fig, 1 tab, 3 ref.

Descriptors: *Surface waters, *Streamflow, *Texas, Basic data collections, *Data collections, *Hydrologic data, Stage-discharge relations, Discharge(Water), Rainfall.

Surface-water records for the 1973 water year for Texas, including records of streamflow or reservoir storage at gaging stations, partial-record stations, and miscellaneous sites, are presented. Records for a few pertinent gaging stations in bordering States also are included. The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. For a lake or reservoir station, capacity tables giving the contents for any stage are prepared from stage-area relation curves defined by surveys. The description of the gaging station gives the location, drainage area, period of record, type and history of gages, average discharge, extremes of discharge or contents, and general remarks. During the 1973 water year, annual runoff over the State was deficient in the west, near normal in the north and central, and excessive in the south and east. (Knapp-USGS)
W74-10268

OPTIMAL DESIGN OF PRESTRESSED CONCRETE PIPES USING LINEAR PROGRAMMING,
Organization S. V. Regional Coll. of Engineering and Technology, Surat (India).
For primary bibliographic entry see Field 8A.
W74-10319

8. ENGINEERING WORKS

8A. Structures

DRAINAGE AND EROSION CONTROL FACILITIES, FIELD PERFORMANCE INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
J. L. Grace, Jr., C. C. Calhoun, Jr., and D. N. Brown.
Available from NTIS, Springfield, Va. 22151 AD-762 537 Price $3.00 printed copy; $1.45 microfiche. Army Engineer Waterways Experiment Station Miscellaneous Paper H-73-6, June 1973. 105 p, 36 fig, 1 tab, 32 ref.

Descriptors: *Drainage systems, *Military reservations, *Erosion control, *Drainage engineering, Drainage practices, Sewers, Filters, Pipes, Outlets, Storm drains.

The drainage and erosion control facilities of 54 military installations were studied to evaluate performance of surface and subsurface drainage systems, erosion control measures, and conditions of buried conduits and associated facilities. The use of poorly graded filter materials permits infiltration of fines into subdrains and is one of the major causes of ineffective subsurface drainage facilities. Filters should be designed relative to base course material rather than the subgrade. Perforated pipe is considered more practical than porous pipe. Manholes and flushing risers should be provided along subdrains at intervals of 1000 feet or less. Screens should be provided over all subdrain outfalls to prevent animals from nesting and debris from entering the pipe. Outfall ditches should be sited, inspected periodically, and cleaned as needed to prevent the possibility of reverse flow into the subdrain system. The location, size, and depth of subdrains are extremely vital in elimination of frost heave. Most flexible and rigid conduits installed during the period 1940-1960 appear to be in good to excellent condition. Improved techniques of collecting, removing, and disposing of industrial wastes from storm water need to be developed and automatic warning devices should be installed to indicate unsafe concentrations in storm-drainage systems. (Knapp-USGS)
W74-09948

SANITARY LANDFILL,
Army Construction Engineering Research Lab., Champaign, Ill.
For primary bibliographic entry see Field 5E.
W74-10018

SHEAR-RESISTANT FLEXIBLE PIPE JUNCTION FOR SEWERAGE AND DRAINAGE.
Hoechst Australia Ltd., Melbourne.
Australian Patent 439,581. Issued September 6, 1973. Australia, Official Journal of Patents, Trade Marks and Designs, Vol 43, No 33, p 3557, September 6, 1973.

Descriptors: *Sewers, Conduits, Engineering structures, *Plastic, *Pipes, Equipment, *Patents.
Identifiers: Collar sections.

A shear-resistant flexible pipe junction for sewerage and drainage is described. It consists of a pipe joint collar fitting of substantially flexible thermoplastic material either rotationally cast, or made by some other process, in the form of cylindrical collar sections. Two adjoining plain pipes abut the collar sections. The collar includes two or more axially-spaced internal annular spaces, one in each section to accommodate a resilient sealing ring for sealing the pipes. There is an external circumferential groove extending between the internal spaces. The flexibility of the groove permits a pair of adjoining pipes to undergo relative angular movement without pipe or seal breakage. (Merritt-FIRL)
W74-10019

DRAINAGE GRATING,
P. D. Basev, K. G. Ipatova, and I. S. Shirior.
Soviet Patent 374,424. Issued April 25, 1973. Soviet Inventions Illustrated, Section III, Mechanical and General, U(47), p 3, December 27, 1973.

Descriptors: Storm water, *Storm drains, Intakes, *Urban drainage, Sewers, Municipal wastes, *Patents, Water pollution control.
Identifiers: *Grating.

A grating of half-cylindrical form designed to retain litter and general rubbish being carried along by storm water and sewage is described. The concept is similar to a radio tuning-coil, in that a sector composed of plates can be rotated inside the main grating. The closed section can therefore be altered so that it always faces the direction of flow thus retaining the rubbish, while the water passes through the open section. The unit consists of a flat framework with semi-circular plates forming a grating. Interposed between the plates are further plate sectors connected to an operating rod. The rubbish carried along by the rain or sewage flow is separated from the waterby rotating the plates to face the water flow. Stops are provided to prevent overtravel of the swinging sector. (Merritt-FIRL)
W74-10026

FILTRATION APPARATUS AND METHOD.
Holliday (L. B.) and Co. Ltd., Sydney (Australia).
Australian Patent 445, 653. Issued May 5, 1969. Official Journal of Patents, Trade Marks and Designs, Vol 44, No 7, p 669, February 28, 1974.

Descriptors: *Patents, *Filtration, *Separation techniques, Liquids, Pressure, Equipment, Flow, Pressure, *Waste water treatment.
Identifiers: Solids.

Separation of a solid medium from aliquid medium is accomplished by a cylindrical inner wall for the housing, a cylindrical core with a longitudinal bore, and an axially moveable core which makes up a filtration apparatus. A pressure chamber is provided by a flexible tube diaphragm within the housing, located within the annular cavity. A deformable lip is joined to the body portion but is free from the core, adapted to come into sealing contact with a co-operating portion of the housing in the operative position of the core. A liquid-solid inlet is defined; and a third portion of the housing defines a fluid inlet leading into the pressure chamber between the inner wall and the outside of the diaphragm. A fourth and final portion of the housing defines a fluid outlet leading from the pressure chamber to outside the housing, with means for exerting a fluid pressure on the outside of the diaphragm via the fluid inlet, pressure being releasable via the fluid outlet. (Prague-FIRL)
W74-10034

DESIGNING AN EFFICIENT WELL CAN BE EASY,
Universal Oil Products, St. Paul, Minn. Johnson Div.
J. L. Mogg.
Water and Waste Engineering, Vol 2, No 1, p A-1 - A-2, January, 1974, 1 fig.

Descriptors: Water supply, Wells, *Design standards, *Performance, *Design.
Identifiers: *Well efficiency.

Steps to be followed in designing a large capacity well (once the yield is known) are outlined. These steps consist of: 1) Selecting casing size, based on yield; 2) Selecting screen length as about 70% of thickness of aquifer and position screen in the center of the aquifer or toward the bottom portion; 3) Choosing a gravel pack that is approximately five times as coarse as the gradation of the aquifer material; 4) Specifying a screen slot opening that will retain 90% of the gravel pack; 5) Selecting a screen diameter that will transmit the yield of the well at a well screen entrance velocity of 0.1 ft/sec. (Often the screen diameter is smaller than the casing); 6) Selecting the hole diameter opposite where the screen is to be positioned by selecting a thickness of the gravel pack between three and eight in; 7) Specifying that the gravel pack particles be uniform (uniformity coefficient to be 2.5 or less) clean, well rounded, and consisting mostly of silica particles (95%). (Martino-NWWA)
W74-10104

OPTIMAL DESIGN OF PRESTRESSED CONCRETE PIPES USING LINEAR PROGRAMMING,
Organization S. V. Regional Coll. of Engineering and Technology, Surat (India).
M. C. Thakkar, and J. K. S. Rao.
Computers and Structures, Vol 4, No 2, p 373-380, March 1974. 3 fig, 2 tab, 17 ref.

Descriptors: *Structural design, *Linear programming, *Concrete pipes, Water supply, Pipelines, Lakes, Optimization, Constraints, Costs, Systems analysis, Mathematical models.
Identifiers: *India(Veeranam Lake).

Non cylinder composite type prestressed concrete pipes are being used extensively in India for high pressure water supply lines. These pipes are being designed presently by the conventional 'analysis' type structural design process where, for an assumed geometric property, either design behavior at various loading stages is checked or pressure capacity is worked out. Contrary to this, a 'synthesis' type process of design is presented, which provides several alternatives from which to select the optimum. Specifically, design behavior at various loading stages and pressures is considered as an input in the design process ('synthesis'), and geometric properties are generated as an output. The optimal design solution is found using linear programming; constraints are derived for safe behavior at various loading stages. The objective function is the cost of materials; labor costs, laying costs, costs of mortar cover and secondary reinforcements are assumed as being constant for all alternatives. An illustrative design example, considering Veeranam Lake--Madras 230 km pipe line, shows substantial economy over conventionally-designed pipes. The optimal solution satisfies the behavior under transient loadings, earth loads, and possible load combinations. (Bell-Cornell)
W74-10319

8B. Hydraulics

HYDROGRAPHY OF THE CHESAPEAKE AND DELAWARE CANAL,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 4A.
W74-09944

METHOD FOR CONTROLLING FLOW OF AQUEOUS FLUIDS IN SUBTERRANEAN FORMATIONS,
Dow Chemical Co., Midland, Mich.
For primary bibliographic entry see Field 8G.
W74-10029

THE RIGHT CHEMICALS ARE ABLE TO RESTORE OR INCREASE WELL YIELD, PART II,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 8G.
W74-10085

PROCESS FOR THE DETECTION OF HYDROGEN SULFIDE IN DRILL BIT CUTTING,
Cities Services Oil Co., Tulsa, Okla.
For primary bibliographic entry see Field 8G.
W74-10086

WELLBORE EFFECTS IN INJECTION WELL TESTING,
Marathon Oil Co., Denver, Colo.
For primary bibliographic entry see Field 8G.
W74-10091

PRESSURE BUILDUP AND FLOW TESTS IN WELLS,
Shell Oil Co., New York.
C. S. Matthews, and D. G. Russell.
Storm Printing Corp., Dallas, Texas, 1967. 167 p.

Descriptors: Reservoirs, *Hydraulic engineering, Hydraulics, Potential flow, Flow measurement, Pressure.
Identifiers: Reservoir engineering, *Pressure buildup, *Flow tests.

A comprehensive study of the creation and analysis of transient pressure responses in wells is presented. The basic principles are reviewed, and the applicability and limitations of the various techniques are critically discussed and illustrated. Chapters consider the following areas of reservoir engineering: (1) mathematical basis for pressure analysis methods, (2) pressure buildup analysis, (3) determination of average reservoir pressure, (4) pressure drawdown analysis, (5) multiple-rate flow test analysis, (6) analysis of well interface tests, (7) pressure analysis in injection wells, (8) drillstem test pressure analysis, (9) effect of reservoir heterogeneities on pressure behavior, and, (10) practical aspects of pressure analysis. The concluding chapter reviews the state of the art in reservoir engineering, defines current problems and points to areas of further research. (Campbell-NWWA)
W74-10092

EXPERIMENTAL INVESTIGATION OF HYDRAULIC FRACTURING THROUGH PERFORATIONS,
Halliburton Services, Duncan, Okla.
A. A. Daneshy.
Journal of Petroleum Technology, p 1201-1206, October, 1973. 9 fig, 1 tab, 3 ref.

Descriptors: *Fractures, *Fracture permeability.
Identifiers: *Hydraulic fractures, *Perforations, Perforation arrangement, Breakdown pressure.

Experimental results are presented to show the effect of perforation geometry on hydraulic fracturing. The experimental results are based on tests conducted on five samples for each perforation arrangement. The experiments indicated that hydraulic fracturing through perforations increases breakdown pressure as the number of perforations decreases. Helicol perforations were superior to line perforations in establishing communication with hydraulic fractures. The pressure of casing and perforations seem to have little influence on the direction of fracturing. (Staplin-NWWA)
W74-10093

WATER IS WHERE YOU FIND IT,
Universal Oil Products, St. Paul, Minn. Johnson Div.
R. L. Scheurs.
The Johnson Drillers Journal, September-October, 1973, p 3-5, 6 fig.

Descriptors: Topography, Saturation, *Aquifer characteristics, *Alluvial fans, *Fracture permeability, *Glacial aquifers, Saline water.
Identifiers: Aquifer thickness, Saturation thickness.

A series of six illustrations with accompanying explanations are given to show why some wells are successful while nearby wells are considered a failure because of inadequate yield or poor water quality. These illustrations represent groundwater conditions related to: (1) the effect of topography on saturation and aquifer thickness; (2) salt water areas; (3) alluvial fan deposits; (4) low yielding fractured rocks; and (5) glaciated deposits. (Campbell-NWWA)
W74-10094

TEST WELL YIELDS DATA ON HYDROGEOLOGIC PROPERTIES OF SUBSURFACE MATERIALS,
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 4B.
W74-10095

INERTIAL AND SLIP EFFECTS IN STEADY-STATE RADIAL GAS FLOW THROUGH POROUS MEDIA,
Alberta Univ., Edmonton.
For primary bibliographic entry see Field 8G.
W74-10096

DETERMINING FRACTURE PRESSURE GRADIENTS FROM WELL LOGS,
Schlumberger Well Services, Houston, Tex.
R. A. Anderson, D. S. Ingram, and A. M. Zanier.
Journal of Petroleum Technology, November, 1973. p 1259-1268, 12 fig, 2 tab, 19 ref, 1 append.

Descriptors: *Borehole geophysics, Fractures, Pore pressure, Porosity, Overburden.
Identifiers: *Fracture pressure gradient, Gulf Coast, *Sonic log, *Density log, Well logs, Biot.

An expression for computing fracture pressure gradient in Gulf Coast sands as a function of overburden pressure, pore pressure, porosity, Poisson's ratio, and well depth is developed using Biot's stress/strain relationships. Using field data, an empirical relationship is established between Poisson's ratio and the shaliness of the sand as derived from well logs. This relationship enables one to use sonic and density logs to determine pore pressure and overburden stress, which are needed to calculate the fracture pressure gradient. (Campbell-NWWA)
W74-10099

HERE'S HOW TO FIND PERMEABILITY FROM DRAWDOWN AT A CONSTANT RATE,
British Petroleum Co., Ltd., London (England).
F. H. Mann.
The Oil and Gas Journal, September 18, 1968. p 148-149, 1 fig, 2 ref.

Descriptors: *Permeability, *Drawdown, *Flow resistance.
Identifiers: *Skin-free pressure, Pressure decline, *Constant pressure decline.

Assuming ideal conditions, a direct method is discussed to find formation flow resistance and permeability from a single measurement of drawdown. To apply this method it must be assumed that the well has flowed at a constant rate from an initially static condition, that fluid of a small and constant compressibility is being produced from an infinite, homogeneous and isotropic reservoir, and that the bottom-hole drawdown contains no excess due to skin effect. The method offers three main advantages over others in that it uses the exact formula for pressure decline, it requires no iteration, and it avoids estimating a radius of drainage. Examples are given to illustrate the method. (Martino-NWWA)
W74-10101

DESIGNING AN EFFICIENT WELL CAN BE EASY,
Universal Oil Products, St. Paul, Minn. Johnson Div.
For primary bibliographic entry see Field 8A.
W74-10104

VACUUM SEWER SYSTEMS FOR NORTHERN APPLICATIONS,
Project Planning Associates Ltd., Toronto (Ontario).
For primary bibliographic entry see Field 5D.
W74-10174

VACUUM SEWAGE TRANSPORT AND TREATMENT IN RURAL AREAS IN DENMARK,
Electrolux A/S (Denmark).
For primary bibliographic entry see Field 5D.
W74-10175

TURBULENT DIFFUSION IN LIQUID JETS: FINAL REPORT,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
For primary bibliographic entry see Field 5B.
W74-10195

TURBULENT DIFFUSION IN LIQUID JETS: PART I, MEASUREMENT OF PARTICLE CONCENTRATION BY A LIGHT SCATTERING PROBE,
Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
For primary bibliographic entry see Field 5B.
W74-10196

NEGATIVELY BUOYANT JETS IN A CROSS FLOW,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 5B.
W74-10200

VARIATION OF REGIME COEFFICIENTS IN PAKISTAN CANALS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
K. Mahmood.
Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers Vol 100, No WW2, Paper 10514, p 85-104, May 1974. 9 fig, 3 tab, 16 ref, append.

Descriptors: *Sediment transport, *Open channel flow, *Alluvial channels, Hydraulics, Flow resistance, Canals, Irrigation canals, Regime.
Identifiers: *Pakistan.

The three degrees-of-freedom of hydraulic regime in a straight alluvial canal can be represented by Froude number F; width-depth ratios, and energy gradient S. They can also be represented by the coefficients in regime equations. The physical interpretation of these regime coefficients was investigated to explain Lacey's regime equations. Data on Pakistan Canals are analyzed in the framework of regime theory and it is shown that: (1) The width of a stable channel section is related to the maximum operational discharge; and (2) the regime coefficients a1 and a4 are related as the bed material load and resistance functions of sand-bed channels. In their day-to-day operation, the sand-bed alluvial canals have only one degree-of-freedom that is related to their bed material load. (Knapp-USGS)
W74-10219

GUIDELINES FOR THE DESIGN OF SUBSURFACE DRAINAGE SYSTEMS FOR HIGHWAY STRUCTURAL SECTIONS,
Cedergren/KOA, Sacramento, Calif.
For primary bibliographic entry see Field 4C.
W74-10235

ENERGY DISSIPATOR FOR SANTA PAULA CREEK, SANTA CLARA RIVER, CALIFORNIA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
J. H. Ables, Jr.
Sponsored by U.S. Army Engineer District, Los Angeles, Technical Report H-73-11, June 1973. 66 p, 17 photo, 20 pl, 2 ref.

Descriptors: *Energy dissipation, *Hydraulic models, *Open channel flow, *California, Design.
Identifiers: *Santa Paula Creek(Calif.), *Santa Clara River(Calif.).

The Santa Paula energy dissipator at the confluence of Santa Paula Creek and Santa Clara River will reduce velocities and dissipate energy from flood flows. Since flood flows could occur in the Santa Paula Channel with little or no tailwater effect from flow in the Santa Clara River, an energy dissipator that will function satisfactorily regardless of tailwater elevation was desirable. Thus, a deisign with impact blocks placed throughout the structure to gradually reduce velocities and induce backwater in the channel was used. Tests revealed that flow conditions in the high-velocity channel and curve immediately upstream of the energy dissipator were satisfactory, while conditions in the original design energy dissipator were unsatisfactory. Riprap requirements at the dissipator outlet and Santa Clara River were determined. (WES)
W74-10314

LOCK AND DAM NO. 8, ARKANSAS RIVER NAVIGATION PROJECT; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
J. J. Franco, and C. D. McKellar, Jr.
Sponsored by U.S. Army Engineer District, Little Rock, Technical Report H-73-10, May 1973. 98 p, 2 tab, 42 pl.

Descriptors: *Hydraulic models, *Locks, Inland waterways, *Arkansas, Design.
Identifiers: *Arkansas River Navigation Project.

Lock and Dam No. 8 will consist of a 110- by 600-ft lock and a 1120-ft-long, gated, nonnavigable dam. A movable-bed model reproducing 11.0 miles of the Arkansas River, with a horizontal scale of 1:120 and a vertical scale of 1:80, was used to determine: (a) the suitability of the proposed site for the lock and dam structure; (b) adequacy of proposed regulating works in the reach upstream and downstream of the structures and modifications required to provide adequate channel dimensions and satisfactory navigation conditions with minimum maintenance; and (c) relative effectiveness of various sizes of initially dredged channels in a section of river similar to the section reproduced in the model downstream of the dam. (WES)
W74-10315

OUTLET WORKS FOR SITE 16, PAPILLION CREEK AND TRIBUTARIES, NEBRASKA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
B. P. Fletcher.
Sponsored by U.S. Army Engineer District, Omaha,. Technical Report H-73-17, October 1973. 50 p, 4 photo, 23 pl.

Descriptors: *Hydraulic models, *Outlet works, *Nebraska, Flood control, Earth dams.
Identifiers: *Papillion Creek(Neb).

The recommended project plan for flood control on Papillion Creek (Nebraska) at the Site 16 reservoir includes the construction of an earth dam, an uncontrolled spillway, and an uncontrolled outlet works consisting of an intake structure and conduit through the dam. A model study was considered warranted since the Site 16 outlet works included structural features that had not been studied in the previous model studies, namely, low-level intakes, an access shaft, a change in both conduit grade and alignment, and an orifice-control device located at the conduit entrance. Results were as follows: (a) Intermingling and instability of the nappes as flow passed through the low-level intakes were eliminated. (b) The 6-ft-diam access shaft was reduced to 3 ft permitting the release of air entrained within the flow that created slug flow within the conduit when the conduit flowed full upstream of the access shaft. (c) A dimensionless equation was developed for calculating the discharge capacity of roof constrictions to establish orifice control at a conduit entrance. (d) Equations were developed for calculating the discharge characteristics associated with weir and orifice control at the intake of similar outlet works. (WES)
W74-10316

GRAYS HARBOR ESTUARY, WASHINGTON; REPORT 1, VERIFICATION AND BASE TESTS. APPENDIX A: SUPPLEMENTARY BASE TEST DATA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
N. J. Brogdon, Jr., and G. M. Fisackerly.
Sponsored by U.S. Army Engineer District, Seattle. Technical Report H-72-2, May 1973. 330 p, 4 tab, 309 pl.

Descriptors: *Estuaries, *Hydraulic models, *Washington, Salinity, Dispersion.
Identifiers: *Chehalis River(Wash), *Grays Harbor(Wash).

The existing comprehensive fixed-bed model of the Grays Harbor estuary was used to obtain current velocity, salinity, and flushing and dispersion data for model conditions of mean tide and low and high freshwater inflow. These data will supplement model base condition data obtained earlier in the model study with a mean freshwater inflow. A general dye dispersion study, consisting of dyes released at six individual locations, was conducted with model conditions of mean tide and low freshwater inflow. These data can be utilized to predict the general flushing and/or dispersion characteristics of a possible future pollutant source that had its origin in one of the six general areas. (See also W72-14727) (WES)
W74-10317

A MATHEMATICAL MODEL FOR THE ANALYSIS OF RIVER DIVERSIONS,
Hydraulics Reasearch Station, Wallingford(England).
W. R. White.
The Institution of Civil Engineers, Proceedings, Part 2, Research and Theory, Vol 55, p 371-389, June 1973. 15 fig, 2 tab, 9 ref.

Descriptors: *Simulation analysis, Rivers, *Diversion, *Design, *Dams, Operations, Optimum development plans, Flow water levels, Structures, Construction, Planning, Systems analysis, Equations, *Mathematical models.
Identifiers: *Argentina(Rio Limay), El Chocon Dam(Argentina), Field data, Closure schemes.

River diversion is a critical stage in the construction of a permanent dam. The consulting engineer needs to determine the optimum design for the diversion works at an early stage of the project and, later on, the contractor must know whether a successful closure is possible at the prevailing flows and within his available resources. Presented is a mathematical model which seeks to answer these questions; the model simulates the diversion operation and adapts step by step calculations to the use of a computer. The alternatives are a physical model or step by step calculation using a slide rule. The performance of the model is compared with prototype data obtained during the diversion of the Rio Limay at El Chocon (Argentina), and alternative diversion schemes illustrate the speed and versatility of the new modeling technique. (Bell-Cornell)
W74-10320

8C. Hydraulic Machinery

ELECTRICAL ENERGY AND ITS ENVIRONMENTAL IMPACT - PROGRESS REPORT, DECEMBER 31, 1972.
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5C.
W74-09836

DISTRIBUTION AND RELEASE OF TRITIUM IN HIGH-TEMPERATURE GAS-COOLED REACTORS AS A FUNCTION OF DESIGN, OPERATIONAL, AND MATERIAL PARAMETERS,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W74-09838

HYDRAULIC SEWER PIPE LINE CLEANER,
Conco Inc., Mendota, Ill.
R. C. Latall.
Canadian Patent 939,459. Issued January 8, 1974. Canadian Patents, Vol. 102, No 2, p 76, January 8, 1974.

Descriptors: *Pipes, Pipelines, Pumping, *Sewers, Municipal wastes, *Patents, Waste water treatment.
Identifiers: *Pipe cleaner.

A skid-mounted jet-propelled, hydraulic, pipeline cleaner is described which is activated from a stationary high pressure water pumping unit to which it is connected by a flexible hose. The cleaner includes: a novel skid arrangement of extreme rigidity and a selectively positionable waterjet capable of assuming either a propelling position or a tool flushing positon. A jet propulsion system was designed so that the jet discharges directly into the pipeline void and does not impinge against any portion of the pipeline cleaner as a whole so that no retarding influence is offered to the free forward motion of the cleaner. (Merritt-FIRL)
W74-10023

PRESSURE BUILDUP AND FLOW TESTS IN WELLS,
Shell Oil Co., New York.
For primary bibliographic entry see Field 8B.
W74-10092

PUMPING WATER BY THE AIR-LIFT METHOD HAS PRACTICAL APPLICATIONS,
Universal Oil Products, St. Paul, Minn. Johnson Div.
D. Kill.
The Johnson Drillers Journal, p 1-3, November-December, 1973. 2 fig, 2 tab.

Descriptors: *Pumping testing, Pumping, Equipment, Pumps, Hydraulic machinery, *Water wells.
Identifiers: *Air-lift pumping.

Pumping water from wells by the air-lift method is described as an extremely important tool for test pumping, developing and maintenance cleaning of water wells of all sizes. The practicability of the air-lift for testing and developing wells stems from the following advantages: easily improvised and installed; readily converted from a pump to an effective development tool; not subject to damage when sand is pumped with water; power unit does not have to be set up for driving pump; many rotary rigs are equipped with high capacity air compressors; trailers or truck-mounted compressors are readily available to cable tool operators. The basic principles of pumping by the air-lift method are described and an example of pump testing a well using air-lift methods is presented. (Martino-NWWA)
W74-10097

WATER SYSTEM OPERATOR NEEDS BASIC INFORMATION TO KEEP PUMPS WORKING, PART I.
Universal Oil Products, St. Paul, Minn.
The Johnson Drillers Journal, p 1-3, 13, March-April 1974. 4 fig, 1 tab.

Descriptors: *Pumps, Design, Pumping.
Identifiers: Inlet head, *Suction characteristics, Pump design, *Pump operation, Submersible pump.

Knowledge of how each well pump and the well in which it is installed function is fundamental to the proper operation of a water well system. Operating characteristics of well pumps are discussed in detail to give the water system operator basic information needed to keep pumps in the proper working order. Design criteria, such as well diameter and pump size, are discussed in terms of optimum performance, long service life, and reasonable cost. The suction characteristics of pumps are discussed in detail and related to factors such as atmospheric pressure, vapor pressure, frictional losses and inlet head. (Campbell-NWWA)
W74-10103

VISCOSITY ACTUATED PHASE SEPARATING (VAPS), FOR OIL-WATER SEPARATIONS,
Union Carbide Corp., Bound Brook, N.J. Chemicals and Plastics.
For primary bibliographic entry see Field 5G.
W74-10231

8D. Soil Mechanics

OUTLET WORKS FOR SITE 16, PAPILLION CREEK AND TRIBUTARIES, NEBRASKA; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W74-10316

BULK DENSITY OF A FRAGIPAN SOIL IN NATURAL AND DISTURBED PROFILES,
Pennsylvania State Univ., University Park. Dept. of Agronomy.
D. D. Fritton, and G. W. Olson.
Soil Science Society of America Proceedings, Vol 36, No 4, p 686-689, July-August, 1972. 3 tab, 7 ref.

Descriptors: *Soil physics, *Soil density, Soil compaction, Soil horizons, *Soil profiles, Soil properties, Soil structure, Soil texture, Soil types, Soils, Silts, Loam.
Identifiers: *Fragipan soils, *Erie channery silt loam.

Bulk density of horizons and layers in soil profiles at two locations (for natural soil and soil above pipelines and a tileline) showed that modification of the Erie channery silt loam fragipan by mechanical disturbance alone results in re-establishing dense soil layers in less than 11 years. Buried topsoil, however, was much less dense after 12 years. (Skogerboe-Colorado State)
W74-10342

8E. Rock Mechanics and Geology

SAVANNAH RIVER LABORATORY PROGRESS REPORT-LONG-RANGE WASTE MANAGEMENT.
Du Pont de Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
For primary bibliographic entry see Field 5E.
W74-09881

EXPLOSIVE FRACTURING IN HEAVY OIL SANDSTONE,
Bureau of Mines, Bartlesville, Okla. Energy Research Center.
J. S. Miller.
Petroleum Engineering, Vol 44, No 13, December, 1972. p 84, 86, 7 fig, 1 ref.

Descriptors: *Explosions, Sandstones, *Oil reservoirs, *Fractures(Geologic), Viscosity, *Kansas.
Identifiers: High-viscosity oil, TNT, Well stimulation, Downhole fracturing.

Engineers of the U.S. Bureau of Mines recently performed an explosive fracturing experiment, using 9000 lb of pelletized TNT, in three wells on the Leap lease 30 miles east of Coffeyville, Kansas. The experiment was performed in the Bartlesville Sandstone formation to create fragmentation and paths of communication between wells so that heavy high-viscosity oil can be produced by an experimental heat-solvent application. Tests indicate that from 50,000 to 65,000 bbl of oil per acre are contained in the sand, but the oil is so viscous that significant amounts cannot be produced by conventional methods. At the time printing, the site had been cleared by blasting, but the sand had not yet been cleaned out of the three wells. After cleanout, tanks and equipment will be installed to inject and circulate a hot solvent into and among the three-well zone. Results of heating, dilution, and penetration of the solvent should indicate the degree of recovery. (Staplin-NWWA)
W74-10088

PREDICTING THERMAL CONDUCTIVITIES OF FORMATIONS FROM OTHER KNOWN PROPERTIES,
California Univ., Berkeley.
J. Anand, W. H. Somerton, and E. Gomaa.
Society of Petroleum Engineers Journal, Vol 13, No 5, p 267-273, October, 1973. 9 fig, 1 tab, 12 ref.

Descriptors: *Thermal conductivity, *Borehole geophysics, Porosity, Permeability, Density, Sandstones.
Identifiers: *Thermal conductivity prediction.

Measuring the thermal properties of rocks and rock-fluid systems is difficult and time consuming, and the results from such measurements are of limited value unless complete descriptions of the rock and fluids are given. A need exists for a method of predicting thermal behavior from other more easily measurable properties. Presented are correlations developed for predicting the thermal conductivity of consolidated sandstone from a knowledge of density, porosity, permeability, and formation resistivity factor. Values for all these properties are available from well logs or core analysis data. Also obtained were correlations for estimating the thermal conductivity of liquid-saturated sandstones from a knowledge of the conductivities of dry sandstones and the saturating liquid and properties of the sandstone. The thermal conductivity of most rocks decreases with increasing temperature and a method of estimating this effect is presented. The effect of pressure on conductivities is generally small, but may be predicted from a knowledge of the bulk compressibility of the rock. (Campbell-NWWA)
W74-10089

BUREAU OF MINES ENVIRONMENTAL ACTION PROGRAMS FOR NORTHEASTERN PENNSYLVANIA--REFUSE BANK REMOVAL; SUBSIDENCE MONITORING,
MITRE Corp., McLean, Va.
For primary bibliographic entry see Field 5A.
W74-10270

8G. Materials

METHOD FOR CONTROLLING FLOW OF AQUEOUS FLUIDS IN SUBTERRANEAN FORMATIONS,
Dow Chemical Co., Midland, Mich.
W. G. Routson.
Canadian Patent 944,548. Issued April 2, 1974. Patents/Brevets, Vol 102, No 14, p 1156, April 2, 1974.

Descriptors: *Flow control, *Patents, Colloids, Subsurface flow, Inorganic compounds, Resistance, Porous media, *Canada, Polyelectrolytes.

The formation of colloidal, water-insoluble, inorganic compounds in the presence of high molecular weight organic polyelectrolytes in dilute aqueous solution provides aqueous compositions having improved resistance to flow through porous subterranean formations. The use of these compositions provides a method for diminishing or shutting off water production in oil wells, for controlling the mobility of aqueous fluids in zones of higher permeability in such formations and for plugging subsurface leaks as in earthen dams. This method provides a useful adjunct in the control of theif zones in oil well drilling and in secondary recovery of petroleum by water flooding techniques. (Merritt-FIRL)
W74-10029

THE RIGHT CHEMICALS ARE ABLE TO RESTORE OR INCREASE WELL YIELD, PART II,
Universal Oil Products, St. Paul, Minn. Johnson Div.
D. C. Schafer.
The Johnson Drillers Journal, p 4-6, March-April, 1974. 1 tab.

Descriptors: *Incrustation, *Chlorination, Chlorine, Phosphorus compounds, Detergents, Surfactants.
Identifiers: Hypochlorites, Sodium polyphosphates, Chemical removal.

The various chemical compounds available to remove well incrustations, and to chlorinate water are discussed in terms of their effectiveness. Several of the hypochlorite products such as calcium, lithium-, and sodium hypochlorite are as effective as chlorine gas for sanatizing water, and less dangerous in handling. The glassy and crystalline varieties of sodium polyphosphates are excellent detergents to be used in dispersing silt and clay particles that reside in sand and gravel aquifers. It is suggested that surfactants or wetting compounds be used in conjunction with dispersing agents and acids to enhance removal of incrustations. (Staplin-NWWA)
W74-10085

PROCESS FOR THE DETECTION OF HYDROGEN SULFIDE IN DRILL BIT CUTTING,
Cities Services Oil Co., Tulsa, Okla.
W. S. Fallgatter.
U.S. Patent 3,702,235, November 7, 1972. 3 p, 3 tab, 3 ref.

Descriptors: Drilling fluids, Drilling samples, Chemical reactions, Mud, Sampling, *Hydrogen sulfide, Filtration, *Deposition, Rotary drilling.
Identifiers: *Drill bit cuttings, Sulphide deposits, Oil-base muds.

A process is described wherein drill bit cuttings are analyzed for hydrogen sulfide content, in order to determine the presence of a hydrogen sulfide deposit. The cuttings are ground in the presence of a hydroxonium ion, subsequently vacuum filtered, and rinsed with distilled water in order to provide a filtrate. The filtrate is introduced into a flask containing a zinc powder, utilized in conjunction with hydrogen chloride to provide a sweep of gas of hydrogen, in order to evolve hydrogen sulfide which is then qualitatively and quantitatively detected. The process allows testing of cuttings of water or oil-base muds to yield accurate determinations of amount of hydrogen sulfide originally present in the drill bit cuttings. (Campbell-NWWA)
W74-10086

PREDICTING THERMAL CONDUCTIVITIES OF FORMATIONS FROM OTHER KNOWN PROPERTIES,
California Univ., Berkeley.
For primary bibliographic entry see Field 8E.
W74-10089

NEW DRILLING-RESEARCH TOOL SHOWS WHAT HAPPENS DOWN HOLE,
Esso Production Research Co., Houston, Tex.
F. H. Deily, W. H. Dareing, G. H. Paff, J. E. Ortloff, and R. D. Lynn.
The Oil and Gas Journal, p 55-65, January 8, 1968. 12 fig, 2 tab.

Descriptors: *Drilling equipment, *Telemetry, Measurement.
Identifiers: *Drill-string, *Bit motion, *Annular pressure, Drill-string forces.

A tool designed to measure and record drill-string forces and motions is described, and data obtained from several field wells are analysed. The tool records axial load, torque, bending, and the rates of change of these values, as well as pressure inside and outside the drill string. Data from the test wells showed that bit weights continually varied from 25 to 50% of the mean weight. At times, maximum bit load reached over 3.5 times the mean load. Bit motions were generally small, but peak-to-peak amplitudes of up to one inch were recorded during rough drilling. Pressure variations in the pipe generally showed four pulses per pump stroke. Annular pressure variations were quite small, but variations of 600 psi were noted. Frequencies of weight, torque, and bending showed evidence of rock-bit tooth action, cone action, rotation, and pump pulsation. (Martino-NWWA)
W74-10090

WELLBORE EFFECTS IN INJECTION WELL TESTING,
Marathon Oil Co., Denver, Colo.
R. C. Earlougher, K. M. Kersch, and H. J. Ramey.
Journal of Petroleum Technology, November, 1973. p 1244-1250, 9 fig, 9 ref.

Descriptors: *Injection, Geologic formations, Evaluation, *Testing procedures, Injection wells.
Identifiers: *Wellbore storage, *Injectivity tests, *Pressure falloff tests.

The effect is discussed of wellbore storage on pressure falloff tests used to investigate formation properties. Data are given showing that, under certain circumstances, wellbore effects can make test interpretation for formation characteristics practically impossible. Field data illustrating the problem, an explanation of these data, suggestions for injection well testing and test analysis are included. The analysis technique is illustrated. (Martino-NWWA)
W74-10091

EXPERIMENTAL INVESTIGATION OF HYDRAULIC FRACTURING THROUGH PERFORATIONS,
Halliburton Services, Duncan, Okla.
For primary bibliographic entry see Field 8B.
W74-10093

INERTIAL AND SLIP EFFECTS IN STEADY-STATE RADIAL GAS FLOW THROUGH POROUS MEDIA,
Alberta Univ., Edmonton.
P. M. Dranchuk, and A. R. Piplapure.
Journal of Petroleum Technology, p 1155-1156, October, 1973, 10 ref.

Descriptors: *Permeability, *Steady flow, Testing procedures, *Porous media.
Identifiers: *Radial gas flow, *Absolute permeability, Linear gas flow, Gas flow tests.

The relationship describing steady horizontal radial gas flow through porous media does not take into account any slip at the gas-solid interface. It has been shown in both the linear and radial gas flow tests that neither slip nor inertial effects should be neglected when using flow tests to evaluate rock properties. The expression for steady horizontal radial gas flow may be modified to allow for slip, and integrated for linear flow. A similar integration for radial flow yields a non-linear ordinary differential equation with no known solution. However, assuming that the ratio of the Klinkenberg slip coefficient to the pressure is sufficiently small, the relation can be reduced to a soluable form. The reduced equation can then be solved for the true absolute permeability. (Staplin-NWWA)
W74-10096

CORROSION BASICS. PT. 7. NEW LIGHT SHED ON CATHODIC PROTECTION,
J. D. Palmer.
Canadian Chemical Processing, Vol 56, No 10, p 60-62, October, 1972.

Descriptors: *Cathodic protection, *Corrosion control, Oxidation, Reduction, *Chemical reactions, Anodes, Cathodes, Electric currents.
Identifiers: *Protective coatings, Buried pipelines, Surface tanks, Wharfs, Pilings.

Cathodic protection, in combination with protective coatings, is the primary means of controlling corrosion in buried and submerged pipelines. It is also used to control corrosion of submerged surface tanks, wharfs, and pilings. The theory involved in cathodic protection is discussed. Each corrosion reaction can be separated into an anodic and a cathodic reaction or, respectively, an oxidation and a reduction reaction. Corrosion takes pl ace at the anode or more negative part of the cell, and no corrosion takes place at the cathode or more positive part of the cell. Current is discharged from the anode in the form of metal ions going into solution, and is accepted at the cathode in the form of positive ions from the environment being reduced at the cathode surface. (Staplin-NWWA)
W74-10102

POTENTIAL USES FOR BOREHOLE LOGS IN MINERAL EXPLORATION,
Sproule (J. C.) and Associates Ltd., Calgary (Alberta).
W. B. Anderson.
Canadian Mining and Metallurgical Bulletin, Vol 67, No 743, p 164-168, March, 1974. 9 fig, 1 tab, 1 ref.

Descriptors: *Wells, *Logging(Recording), *Borehole geophysics, Electric well logging, Radioactive well logging, Subsurface investigations, Exploration, Mining, Oil industry, Groundwater, Computers, Data processing.
Identifiers: Sonic logs, Natural gamma logs, Neutron porosity.

The oil industry uses borehole measurements of electrical characteristics, radioactivity, density and other physical properties to determine quantitatively rock and fluid properties of significance. These same borehole measurements are available to the mining (including groundwater) industry for

quantitative calculations. Standard measuring devices which are lowered into the borehole on electrical cables are available to measure resistivity, natural gamma radiation, density, velocity of sound and hydrogen index (neutron porosity). To demonstrate the use of the technique, typical rock and fluid mixtures encountered in petroleum and potash exploration are shown. Some rock mixtures encountered in coal and metallic mineral exploration are next examined to determine the resolution available and an attempt is made to predict the performance of the logs in the various rock mixtures. (Staplin-NWWA)
W74-10105

FAILURE OF 307 BASIN TRANSFER LINE AND RESULTANT GROUND CONTAMINATION,
Battelle-Pacific Northwest Lab., Richland, Wash.
For primary bibliographic entry see Field 5B.
W74-10127

8H. Rapid Excavation

PROJECT RIO BLANCO: PROMPT ECOLOGICAL EFFECTS RESULTING FROM GROUND MOTION,
Geonuclear Corp., Las Vegas, Nev.
For primary bibliographic entry see Field 5C.
W74-09831

PREDICTION OF GROUND MOTION CHARACTERISTICS OF UNDERGROUND NUCLEAR DETONATIONS.
Environmental Research Corp., Las Vegas, Nev.
Available from NTIS, Springfield, Va 22151 NVO-1163-239 Price $6.00 printed copy; $1.45 microfiche. Environmental Research Corporation Contract Report NVO-1163-239, March 1974. 186 p, 75 fig, 19 tab, 26 ref, 4 append. USAEC Contract AT(29-2)-1163.

Descriptors: *Nuclear explosions, *Seismic studies, Nuclear engineering, Seismic waves, Datqa collections, Construction, Bibliographies.
Identifiers: *Ground motion(Seismic).

Information required for predicting ground motion (peak amplitudes and spectral composition) for underground nuclear detonations is compiled in a manual. This comprehensive report contains information necessary for a technical understanding of the theoretical and empirical bases of ground motion predictions as well as for making ground motion predictions for an arbitrary nuclear detonation. The prediction procedures developed in the report are based on 13 years of experience and are designed to produce information of the type and in the format typically required by a structural engineer performing an evaluation of structural response and damage potential. Extensive references are provided to enable the interested reader to obtain additional information on specific topics of interest. (Knapp-USGS)
W74-09947

EXPLOSIVE FRACTURING IN HEAVY OIL SANDSTONE,
Bureau of Mines, Bartlesville, Okla. Energy Research Center.
For primary bibliographic entry see Field 8E.
W74-10088

EXPLOSIONS FOR CANAL CONSTRUCTION,
I. Potapov.
Available from NTIS, Springfield, Va 22151 JPRS 59042 Price $3.00 printed copy; $1.45 microfiche. Joint Publications Research Service Report No 59042, May 17, 1973. 4 p, (Translated from Nauka i Zhizn', No 1, Moscow, 1973.)

Descriptors: *Explosives, *Excavation, *Canal construction, Explosions.
Identifiers: USSR.

A new method of constructing drainage canals with explosives uses one long horizontal charge instead of a series of separate vertical cylindrical charges. For this purpose a strong elastic polyethylene hose is filled with explosive. The hose is connected to the lower part of the blade of a tractor-mounted trencher. As the tractor moves the blade plows and soil and the charged hose is laid in the soil behind it. When the soil is frozen the hoses are not required and the powder is poured directly into the trench cut by a trenching machine. (Knapp-USGS)
W74-10243

8I. Fisheries Engineering

EVALUATION OF THE EFFECTIVENESS OF STURGEON REPRODUCTION IN THE UPPER POOL OF THE VOLGOGRAD HYDRO DEVELOPMENT SYSTEM BASED ON RESULTS OF COUNTING DOWNSTREAM-MIGRATING JUVENILES IN THE LOWER POOL, (IN RUSSIAN),
G. A. Batychkov.
Tr Volgogr Nauchno-Issled Inst Ozern Rechn Rybn Khoz. 6, p 79-87. 1972.
Identifiers: Counting, Hydro power plants, Juveniles, Migrating fish, Pools, *Reproduction, *Sturgeon, *USSR(Volgograd).

In 1965-1969 about 1500 juvenile sturgeon were caught downstream from the Volgograd hydro development (USSR). The length of the downstream-migrant juveniles ranged from 16-90 cm, predominantly 20-55 cm. The age varied from less than 1 yr (fingerlings) to 11 yr, up to 90% of the juveniles migrated downstream at an age of 2-4 yr and fingerlings comprised about 0.5% in 1965-1967. After damming the Volga near Saratov downstream migration of the fingerlings was not observed, the number of 2-yr-olds decreased and the relative number of 5-yr-old fishes increased. The sturgeon spawners transplanted to the Volgograd reservoir after construction of the Saratov hydro development began to accumulate in its lower pool, where an extremely low effectiveness of reproduction was observed. In 1965-1969 about 700,000 uneven-aged juveniles annually migrated downstream from the reservoir, which is about half that observed during the preceding 5 yr. In all, 11 million juveniles of 15 generations were counted, the most abundant being the 1959 generation from the large school of spawners that had time to reach the spawning grounds before damming the Volga at Volograd. The calculation of the number of spawners is shown.--Copyright 1973, Biological Abstracts, Inc.
W74-09926

TEXTBOOK OF FISH CULTURE. BREEDING AND CULTIVATION OF FISH,
For primary bibliographic entry see Field 2I.
W74-10045

COOK INLET SOCKEYE SALMON INVESTIGATIONS,
Alaska Dept. of Fish and Game, Juneau.
S. Pennoyer, R. Paulus, and A. S. Davis.
Available from NTIS, Springfield, Va 22151, COM-73-10823, Price $3.00 printed copy; $1.45 microfiche. Completion Report NOAA-73042713 for period July 1965-June 1971, March 1972. 166 p, 14 fig, 21 tab, 21 append.

Descriptors: *Alaska, *Salmon, *Fisheries, Data collections, Commercial fish, Commercial fishing, Fish management.
Identifiers: *Cook Inlet(Alaska).

The Sockeye Salmon Investigations project was initiated with an overall objective of collecting biological data from the Cook Inlet (Alaska) sockeye salmon run that would be useful in establishment of more scientific management of the run. These objectives included escapement estimation where visual methods were impractical, determination of smolt outmigration levels, optimum escapement goals, stock identification, revision of catch statistics, and other related projects. Sonar salmon counters, for adult enumeration, were developed and partially tested under this program. Downstream migrant sampling gear was developed that is suitable for use on glacial rivers with high water velocities and severe debris problems. Plans for future smolt programs are discussed. Stock identification studies utilized freshwater circuli counts as the distinguishing feature. Age and sex composition of the run were established. Catch statistics were compiled to reflect catch by period rather than by fishing week. (Knapp-USGS)
W74-10267

PARASITES OF YOUNG GRASS CARP CTENOPHARYNGODON IDELLA (VALENCIENNES) AT FISH FARMS OF THE VOLGA DELTA, (IN RUSSIAN),
For primary bibliographic entry see Field 2I.
W74-10313

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BASE CIVIL ENGINEER SANITARY LABORATORY,
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Office of Information Services (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 6G.
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A BIBLIOGRAPHY OF THE ZOOLOGY OF TENNESSEE AND THE TENNESSEE VALLEY REGION,
Office of Information Services (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 2I.
W74-09826

ANNUAL PROGRESS REPORT FOR THE PERIOD JULY 1971-JUNE 1972-NEW BRUNSWICK LABORATORY.
New Brunswick Lab. (AEC), N.J.
For primary bibliographic entry see Field 5A.
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PUBLICATIONS 1973.
Du Pont de Nemours (E.I.) and Co., Aiken, S.C. Savannah River Lab.
For primary bibliographic entry see Field 5B.
W74-09832

INVESTIGATION OF SOME FACTORS IN THE BIOCHEMICAL CONVERSION OF HG POLLUTANTS TO TOXIC METHYL HG EFFECTED

BY MICROORGANISMS IN A MARINE SEDIMENT,
Naval Academy, Annapolis, Md.
For primary bibliographic entry see Field 5B.
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Raytheon Co, Portsmouth, R.I. Environmental Systems Center.
For primary bibliographic entry see Field 5D.
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For primary bibliographic entry see Field 6E.
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Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.
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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

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